HITACHI

SERVICE MANUAL

TK

No.3261E

VL-S100(U)

Technical Information

S VHS VHS

This video deck is a S-VHS type video recorder. For proper operation, only the S-VHS or VHS type cassette must be used.

MANUALS RELATED TO THE VL-S100(U)

Name of Manual	Language	Manual No.	Chapters included
Technical Data	English	3227E	Chapters 1-8
Technical Information	English	3261E	–

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

S-VHS PROFESSIONAL VCR

April 1990 TOKAI WORKS

CONTENTS

1. EDIT MICROPROCESSOR ··············1
  1-1. Summary on functions ············1
  1-2. System block diagram ···········1
  1-3. IC pin arrangement ·············2
  1-4. Battery check ··················3
  1-5. Pin specifications ·············4

2. SYSTEM CONTROL MICROPROCESSOR ········7
  2-1. Data format····················7
  2-2. S.data output format ···········8
  2-3. S.data output timing ···········9
  2-4. Data format of edit μP ·········9
  2-5. Pin specifications of system control microprocessor··············11
  2-6. Outputs through the expanded port ···13
  2-7. Timer ·························13
  2-8. Troubleshooting ················14

3. DIGITAL PROCESSING CIRCUITS·········16
  3-1. Color decoder ·················16
  3-2. ADC ···························16
  3-3. Play clock generator···········16
  3-4. Reference sync/clock generator·····16
  3-5. Memory and gate array ··········17
  3-6. DAC ···························17
  3-7. Chroma encoder·················17
  3-8. Output process·················17

4. CIRCUIT BOARDS ···················19

5. DESCRIPTION OF SERVO CIRCUIT OPERATIONS···21
  5-1. Jog/shuttle ···················21
  5-2. Reel servo block···············22
  5-3. Fsc PLL lock···················22
  5-4. SW30' generation···············23
  5-5. Framing servo ·················24

6. ASSEMBLY RECORDING ·················25
  6-1. Assembly recording control·······25
  6-2. Automatic editing control ········25
  6-3. Manual recording···············26
  6-4. Rehearsal ·····················26
  6-5. Review·························26

7. SLOW/STILL CONTROL ·················27

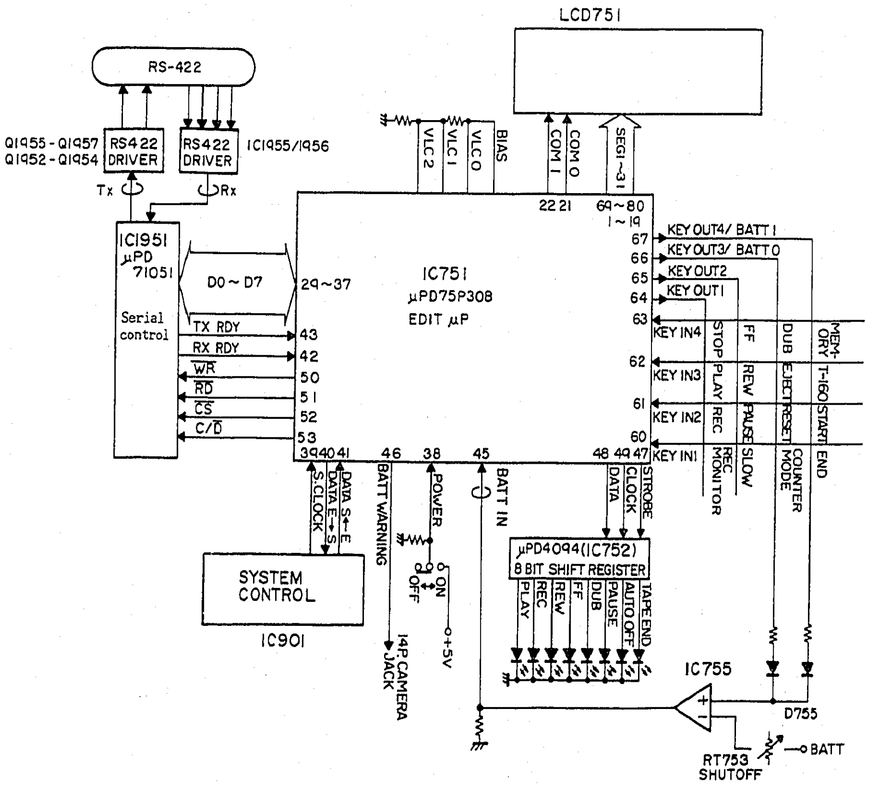
8. MECHANISM·························28
  8-1. General description ············28
  8-2. Major components locations (top view) and operations ·············28
  8-3. Major components locations (side view) and operations·············29
  8-4. Loading mechanism ··············30
  8-5. Main brake drive mechanism·······31
  8-6. Pressure roller and subbrake drive mechanism ······················32
  8-7. T brake and slow brake drive mechanism ······················32
  8-8. F mechanism operation table ······33
  8-9. Front loading mechanism ·········33

1. EDIT MICROPROCESSOR

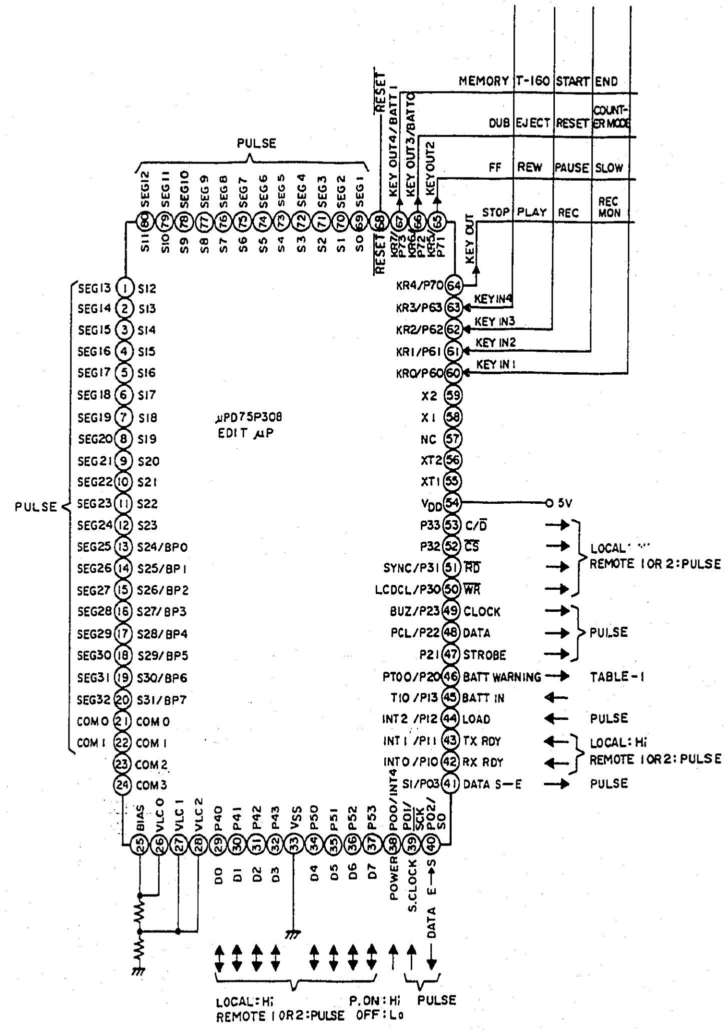
1-1. SUMMARY ON FUNCTIONS

- LCD indications
  - Reel counter
  - Linear time counter
  - Tape remaining
  - Battery power warning
  - Tape loaded indication
- LED indications
  - Modes (PLAY, REC, FF, REW, PAUSE, DUB)
  - AUTO OFF, REC MONI, TAPE E
- Data communications between SYSTEM and EDIT microprocessors
- Detecting battery voltage
- Receiving key inputs
- RS-422 data transfer

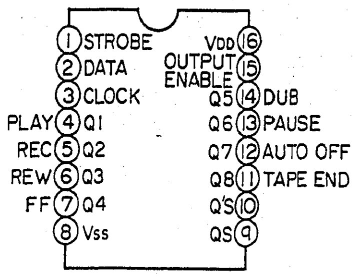
1-2. SYSTEM BLOCK DIAGRAM


LCD751
RS-422
Q1955-Q1957
Q1952-Q1954
RS422 DRIVER
RS422 DRIVER
IC1955/1956
Tx
Rx
VLC2
VLC1
VLC0
BIAS
COM 1
COM 0
SEG1~31
22 21
69~80
1~19
IC1951
μPD 71051
Serial control
D0~D7
29~37
IC751
μPD75P308
EDIT μP
TX RDY
RX RDY
WR
RD
CS
C/D
43
42
50
51
52
53
67
66
65
64
63
62
61
60
KEY OUT4/ BATT 1
KEY OUT3/ BATT 0
KEY OUT2
KEY OUT1
KEY IN4
KEY IN3
KEY IN2
KEY IN1
STOP
PLAY
REC
REC MONITOR
FF
REW
PAUSE
SLOW
DUB
EJECT
RESET
COUNTER MODE
MEM-ORY
T-160
START
END
39 40 41
46
38
45
48 49 47
S.CLOCK
DATA E→S
DATA S←E
BATT WARNING
POWER
BATT IN
DATA
CLOCK
STROBE
SYSTEM CONTROL
IC901
ON
OFF
+5V
14P CAMERA JACK
μPD4094(IC752)
8 BIT SHIFT REGISTER
PLAY
REC
REW
FF
DUB
PAUSE
AUTO OFF
TAPE END
IC755
D755
RT753
SHUTOFF
BATT

1-3. IC PIN ARRANGEMENT


PULSE
SEG12
SEG11
SEG10
SEG9
SEG8
SEG7
SEG6
SEG5
SEG4
SEG3
SEG2
SEG1
S11 80
S10 79
S9 78
S8 77
S7 76
S6 75
S5 74
S4 73
S3 72
S2 71
S1 70
S0 69
RESET 68
KR7/P73 67
KR6/P72 66
KR5/P71 65
RESET
KEY OUT4/BATT1
KEY OUT3/BATT0
KEY OUT2
KEY OUT
MEMORY
T-160
START
END
DUB
EJECT
RESET
COUNTER MODE
FF
REW
PAUSE
SLOW
STOP
PLAY
REC
REC MON
SEG13 1 S12
SEG14 2 S13
SEG15 3 S14
SEG16 4 S15
SEG17 5 S16
SEG18 6 S17
SEG19 7 S18
SEG20 8 S19
SEG21 9 S20
SEG22 10 S21
SEG23 11 S22
SEG24 12 S23
SEG25 13 S24/BP0
SEG26 14 S25/BP1
SEG27 15 S26/BP2
SEG28 16 S27/BP3
SEG29 17 S28/BP4
SEG30 18 S29/BP5
SEG31 19 S30/BP6
SEG32 20 S31/BP7
COM0 21 COM0
COM1 22 COM1
23 COM2
24 COM3
PULSE
µPD75P308
EDIT µP
KR4/P70 64
KR3/P63 63 KEY IN4
KR2/P62 62 KEY IN3
KR1/P61 61 KEY IN2
KR0/P60 60 KEY IN1
X2 59
X1 58
NC 57
XT2 56
XT1 55
VDD 54 5V
P33 53 C/D̄
P32 52 C̄S̄
SYNC/P31 51 R̄D̄
LCDCL/P30 50 W̄R̄
LOCAL:
REMOTE 1OR2:PULSE
BUZ/P23 49 CLOCK
PCL/P22 48 DATA
P21 47 STROBE
PULSE
PT00/P20 46 BATT WARNING
TABLE-1
TI0/P13 45 BATT IN
INT2/P12 44 LOAD
PULSE
INT1/P11 43 TX RDY
INT0/P10 42 RX RDY
LOCAL: Hi
REMOTE 1OR2:PULSE
SI/P03 41 DATA S—E
PULSE
25 BIAS
26 VLC0
27 VLC1
28 VLC2
29 P40
30 P41
31 P42
32 P43
33 VSS
34 P50
35 P51
36 P52
37 P53
38 P00/INT4
39 P01/SCK
40 P02/SO
D0
D1
D2
D3
D4
D5
D6
D7
POWER
S.CLOCK
DATA E→S
LOCAL: Hi
REMOTE 1OR2:PULSE
P.ON: Hi
OFF: Lo
PULSE

Expanded output port


1 STROBE
2 DATA
3 CLOCK
PLAY 4 Q1
REC 5 Q2
REW 6 Q3
FF 7 Q4
8 Vss
VDD 16
OUTPUT ENABLE 15
Q5 14 DUB
Q6 13 PAUSE
Q7 12 AUTO OFF
Q8 11 TAPE END
Q'S 10
QS 9

µPD4098

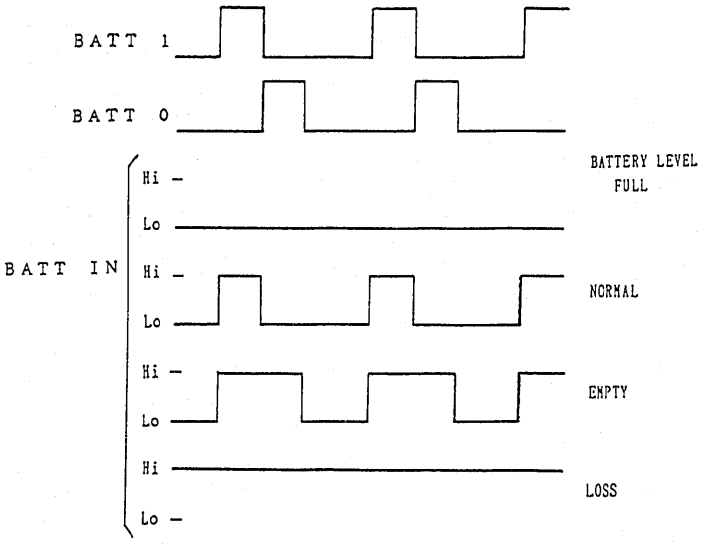
TABLE 1

BATTERY WARNING

BATTERY LEVEL	OUTPUT
FULL NORMAL	LO
EMPTY	PULSE
LOSS	HI

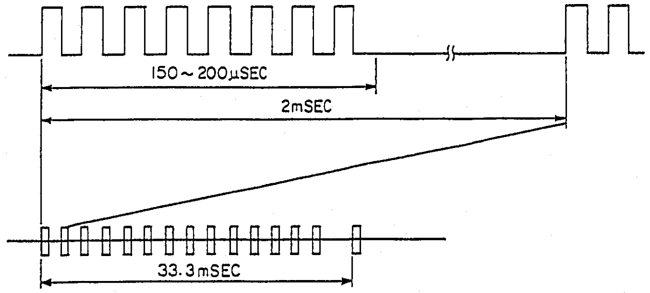
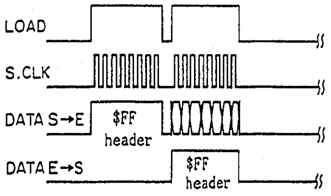
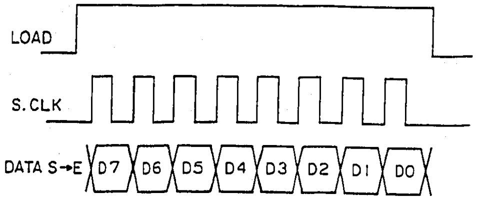
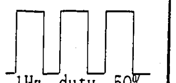
1-4. BATTERY CHECK

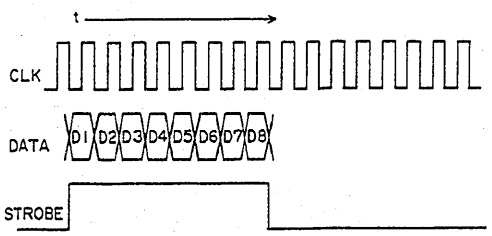
This function checks the battery level and controls the battery indicator and battery warning terminal output. The edit µP outputs the test data via the BATT0 and BATT1 pins and receives a combination of the data according to the test data to detect the voltage level in four steps (FULL, NORMAL, EMPTY, and LOSS).



- When the battery level changes from "EMPTY" to "LOSS", the edit µP transfers the "POWER OFF" command to the system control µP.

1-5. PIN SPECIFICATIONS

<table>
<tr><th>Pin No.</th><th>Name</th><th>I/O</th><th>Function</th></tr>
<tr><td>69~80
1~20</td><td>SEG1-32</td><td>O</td><td>LCD segment drive outputs</td></tr>
<tr><td>21,22</td><td>COM0,COM1</td><td>O</td><td>LCD common outputs</td></tr>
<tr><td>23,24</td><td>COM2,COM3</td><td></td><td>Unused</td></tr>
<tr><td>25</td><td>BIAS</td><td>O</td><td>Connected to VLCO, determines output level at SEG and COM.</td></tr>
<tr><td>26~28</td><td>VLCO~2</td><td>I</td><td>Receive resistor-divided voltage from BIAS, which serves as a reference to drive SEG and COM.</td></tr>
<tr><td>29~32
34~37</td><td>DO~7</td><td>O</td><td>RS-422 I/O terminals</td></tr>
<tr><td>33</td><td>VSS</td><td>-</td><td>Ground</td></tr>
<tr><td>38</td><td>POWER</td><td>I</td><td>Receives POWER ON/OFF signal. Hi: POWER ON.
When this falls to Low, "POWER-OFF:STOP" code will be sent to the system control μP.</td></tr>
<tr><td>39</td><td>S.CLOCK</td><td>I</td><td>Receives clock signal for data transfer between SYSTEM CONTROL and EDIT μPs.
 </td></tr>
<tr><td>40</td><td>DATA E→S</td><td>O</td><td>Output data from EDIT μP to SYSTEM CONTROL μP.

DATA E→S will be sent after the header ($FF) of DATA S→E comes in.</td></tr>
<tr><td>41</td><td>DATA S→E</td><td>I</td><td>Input data to EDIT μP from SYSTEM μP.
 </td></tr>
<tr><td>42</td><td>Rx RDY</td><td>I</td><td>Indicates whether or not RS-422 data can be received. Hi: Ready</td></tr>
<tr><td>43</td><td>Tx RDY</td><td>I</td><td>Indicates whether or not RS-422 data can be transmitted. Hi: Ready</td></tr>
<tr><td>44</td><td>LOAD</td><td>I</td><td>Timing signal for data transmission for SYSTEM CONTROL μP to EDIT μP.</td></tr>
<tr><td>45</td><td>BATT IN
LOCAL/REMOTE</td><td></td><td>Responding to test data sent from BATT0 and BATT1, data comes back to BATT IN. This data indicates one of four voltage levels.
·REMOTE1 when KEY OUT 1 signal comes in
·REMOTE2 when KEY OUT 2 signal comes in
·LOCAL when none of them comes in
During REMOTE2, the keys are disabled and RS-422 communication can be performed.
During LOCAL, the keys and RS-422 reception disabled.
During REMOTE1, the keys and RS-422 reception are enabled but RS-422 transmission is disabled.</td></tr>
<tr><td>46</td><td>BATT WARNING</td><td></td><td>BATT WARNING output
<table>
<tr><th>BATT LEVEL</th><th>BATT WARNING output</th></tr>
<tr><td>Full or NORMAL</td><td>Low</td></tr>
<tr><td>EMPTY</td><td>1Hz duty 50%</td></tr>
<tr><td>Loss</td><td>Hi</td></tr>
</table></td></tr>
<tr><td>47</td><td>STROBE</td><td></td><td>Expanded output port control signal. Hi: During data transfer</td></tr>
</table>

<table>
<tr><th>Pin No.</th><th>Name</th><th>I/O</th><th>Function</th></tr>
<tr><td>48</td><td>DATA</td><td></td><td>Output data through expanded port


t
CLK
DATA
D1 D2 D3 D4 D5 D6 D7 D8
STROBE

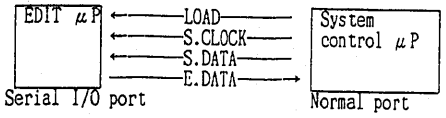
D1: PLAY LED output D2: REC LED output
D3: REW LED output D4: FF LED output
D5: DUB LED output D6: PAUSE LED output
D7: AUTO OFF LED output D8: TAPE END LED output
* LED output Hi: LED lights</td></tr>
<tr><td>49</td><td>CLOCK</td><td>O</td><td>Clock signal for expanded output port</td></tr>
<tr><td>50</td><td>$\overline{WB}$</td><td>O</td><td>RS-422 write control Lo : Write</td></tr>
<tr><td>51</td><td>$\overline{RD}$</td><td>O</td><td>RS-422 read control Lo : Read</td></tr>
<tr><td>52</td><td>$\overline{CS}$</td><td></td><td>Unused</td></tr>
<tr><td>53</td><td>$C/\overline{D}$</td><td>O</td><td>RS-422 data type ID
Hi : Control word/status
Lo : Character data</td></tr>
<tr><td>54</td><td>Vcc</td><td>I</td><td>5V</td></tr>
<tr><td>55</td><td>XT_1</td><td></td><td>Connects to sub clock oscillator (unused)</td></tr>
<tr><td>56</td><td>XT_2</td><td></td><td>Same as above</td></tr>
<tr><td>57</td><td>NC</td><td></td><td>———</td></tr>
<tr><td>58</td><td>X_1</td><td></td><td>Connects to main system clock oscillator (4.19MHz)</td></tr>
<tr><td>59</td><td>X_2</td><td></td><td>Same as above</td></tr>
<tr><td>60~63</td><td>KEY IN 1~4</td><td>I</td><td>Inputs from key matrix
<table>
<tr><th colspan="2"></th><th colspan="4">Inputs</th></tr>
<tr><th colspan="2"></th><th>KEY in 1</th><th>KEY in 2</th><th>KEY in 3</th><th>KEY in 4</th></tr>
<tr><td rowspan="4">Out-puts</td><td>KEY OUT1</td><td>REC MONITOR</td><td>REC</td><td>PLAY</td><td>STOP</td></tr>
<tr><td>KEY OUT2</td><td>SLOW</td><td>PAUSE</td><td>REC</td><td>FF</td></tr>
<tr><td>KEY OUT3</td><td>COUNTER MODE</td><td>RESET</td><td>EJECT</td><td>DUB</td></tr>
<tr><td>KEY OUT4</td><td>END</td><td>START</td><td>T-160</td><td>MEMORY</td></tr>
</table></td></tr>
<tr><td>64~67</td><td>KEY OUT 1
KEY OUT 2
KEY OUT 3 /BATTO
KEY OUT 4 /BATT1</td><td>O</td><td>Output to key matrix
Test data to check battery</td></tr>
<tr><td>68</td><td>$\overline{RESET}$</td><td>I</td><td>Reset signal Lo : Active</td></tr>
</table>

2. SYSTEM CONTROL MICROPROCESSOR

2-1. Data formats (SYSTEM CONTROL ←→ EDIT)

2-1-1 Communication outlined

- 3-line serial data + LOAD
- 88 bits/block (S.DATA)
- 56 bits/block (E.DATA)


EDIT μP
LOAD
S.CLOCK
S.DATA
E.DATA
System control μP
Serial I/O port
Normal port

2-1-2 System control data format (S.DATA)

A block of four different data comes from the system control μP at the rate of 30 Hz.

1) Header
2) Counter data (linear time counter, reel counter, tape remaining)
3) Edit control data
4) System control status data

These data are explained below.

- Header -

The header marks the beginning of every input data block. It is an 8-bit data, $FF.

If the header cannot be read, the subsequent data will be ignored until the next header is encountered.

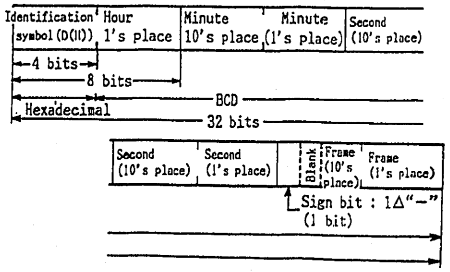
HADR = $FF (8 bits)

- Counter data -

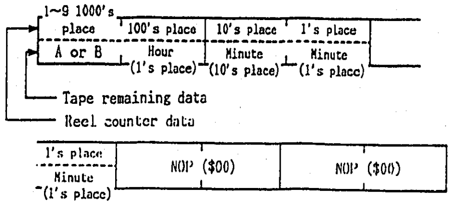
This consists of 32 bits.

The first 4 bits identifies the counter data. If the 4-bit counter ID is invalid, the subsequent data will be ignored until the next header is encountered. (The counter values will remain unchanged.)

(1) Linear counter data


Identification symbol (D(H))
Hour 1's place
Minute 10's place
Minute (1's place)
Second (10's place)
4 bits
8 bits
BCD
Hexadecimal
32 bits
Second (10's place)
Second (1's place)
Blank
Frame (10's place)
Frame (1's place)
Sign bit : 1Δ"−" (1 bit)

(2) Reel counter and tape remaining data


1~9 1000's place
100's place
10's place
1's place
A or B
Hour (1's place)
Minute (10's place)
Minute (1's place)
Tape remaining data
Reel counter data
1's place
Minute (1's place)
NOP ($00)
NOP ($00)

*The reel counter and tape remaining data are the first 16 bits and the remaining 16 bits are insignificant ($00).

① Counter ID
First 4 bits ┬ 0-9(hex) ——Reel counter data
├ A(hex) ——Tape remaining (T-120)
├ B(hex) ——Tape remaining (T-120)
└ D(hex) ——Linear time counter data

② Low-order 12 or 32 bits ┬ 0~9(hex) :BCD notation
├ A~B(hex):blank
└ C~E(hex):"—"

- Edit control data -

7 × 20 ; STATUS DATA

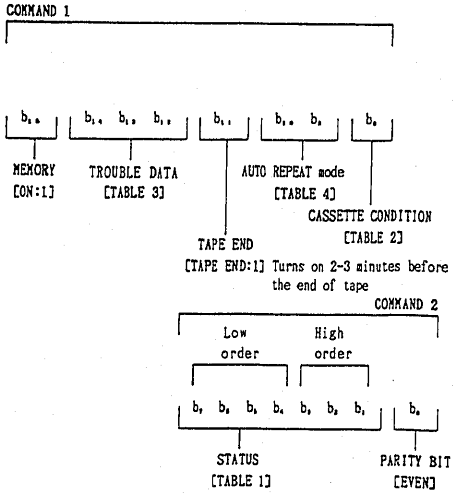
Status data of the answer command associated with the "61·20 ; STATUS SENSE" command will be converted to the controller format [7 × 20 ; STATUS DATA] according to the following information given from the system control μP and sent to the controller.

DATA No	Bit7 (MSB)	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0 (LSB)
—	—	—	—	—		—	—	—
0	STANDBY	LOCAL	STOP		REW	FF	REC	PLAY
1	SERVO LOCK		SHUTT-LE	JOG		TAPE DIREC-TION	STILL	CUE-UP
2	AUTO MODE	FULLEE	TAPE UNTHR-EAD	EDIT				
3	REC INHIBIT	INSERT	ASSEMBLE	VIDEO			A2	A1

- System control status data -

This is a 16-bit data including MEMORY ON/OFF data, trouble data, tape status, AUTO REPEAT mode, cassette condition, status, parity bit, "last 2-3 minutes' remaining" sign.

The bit structure of this data is shown below.


COMMAND 1
b_{15}
b_{14} b_{13} b_{12}
b_{11}
b_{10} b_9
b_8
MEMORY [ON:1]
TROUBLE DATA [TABLE 3]
AUTO REPEAT mode [TABLE 4]
CASSETTE CONDITION [TABLE 2]
TAPE END
[TAPE END:1] Turns on 2-3 minutes before the end of tape
COMMAND 2
Low order
High order
b_7 b_6 b_5 b_4 b_3 b_2 b_1
b_0
STATUS [TABLE 1]
PARITY BIT [EVEN]

[TABLE 1] SYSTEM CONTROL DATA FORMAT (SYSTEM CONTROL → EDIT)

Low order / High order	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0					/											
1	STOP	FF	REWIND			RECORD	V.DUB	PLAY	CUE	REVIEW	SLOW		A.DUB	FAST	REV	POFF
2	STOP PAUSE			REC PAUSE	V.DUB PAUSE			STILL				F.ADV	A.DUB PAUSE			
3	STOP DEW															POFF DEW
4																
5																
6																
7																Unused

[TABLE 2]

b_{8}	Function
1	TAPE IN
0	NO TAPE

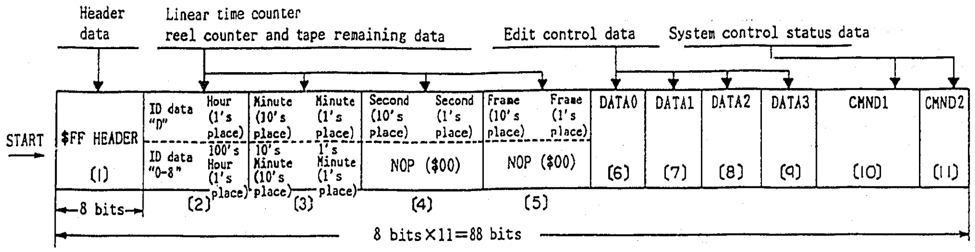
[TABLE 3]

b_{14}	b_{13}	b_{12}	Function
0	0	0	NORMAL
0	0	1	CYLINDER LOCK
0	1	0	REEL LOCK
0	1	1	CASSETTE LOAD LOCK
1	0	0	TAPE LOAD LOCK
1	0	1	TAPE END
1	1	0	Unused
1	1	1	Unused

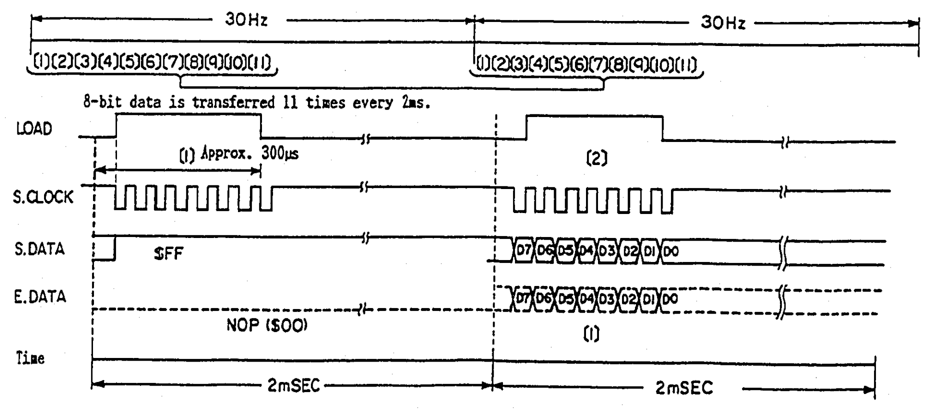
[TABLE 4]

b_{10}	b_{9}	Function
0	0	NORMAL
0	1	IN point entered
1	0	IN and OUT points entered
1	1	Unused

2-2. S. DATA output format (1 block)


Header data
Linear time counter
reel counter and tape remaining data
Edit control data
System control status data
START
$FF HEADER
(1)
ID data "D"
Hour (1's place)
ID data "0-8"
100's Hour (1's place)
(2)
Minute (10's place)
Minute (1's place)
10's Minute (10's place)
1's Minute (1's place)
(3)
Second (10's place)
Second (1's place)
NOP ($00)
(4)
Frame (10's place)
Frame (1's place)
NOP ($00)
(5)
DATA0
(6)
DATA1
(7)
DATA2
(8)
DATA3
(9)
CMND1
(10)
CMND2
(11)
8 bits
8 bits×11=88 bits

2-3. S.DATA output timing


30Hz
30Hz
(1)(2)(3)(4)(5)(6)(7)(8)(9)(10)(11)
(1)(2)(3)(4)(5)(6)(7)(8)(9)(10)(11)
8-bit data is transferred 11 times every 2ms.
LOAD
(1) Approx. 300μs
(2)
S.CLOCK
S.DATA
$FF
D7 D6 D5 D4 D3 D2 D1 D0
E.DATA
D7 D6 D5 D4 D3 D2 D1 D0
NOP ($00)
(1)
Time
2mSEC
2mSEC

Notes:
① To prevent misplacement of data bits, the SERIAL DATA counter and modulo-8 counter will be cleared when LOAD turns HIGH.
② S.CLOCK serves as the reference timing of data I/O. Data will be updated at the fall of S.CLOCK and received at its rise.

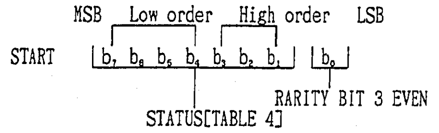
2-4. DATA FORMAT (E.DATA) OF EDIT μP

Each block of data coming from the EDIT μP contains four kinds of information as follows.

1 EDIT command data
2 EDIT PRESET data
3 REMOTE data
4 DUMMY data (NOP ($00))
These are explained below.

2-4-1 EDIT command data

This is 8 bits as shown below.


MSB
Low order
High order
LSB
START
b7 b6 b5 b4 b3 b2 b1
b0
RARITY BIT 3 EVEN
STATUS[TABLE 4]

2-4-2 Dummy data

This 8-bit data will be sent at the end of every block.
(Also refer to "E.DATA output timing".)

2-4-3 EDIT PRESET data

This 8-bit data will be received from the controller and simply transferred to the system control μP.

DATA-1

	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
START→	–	INSERT	ASSEMBLE	VIDEO	SWC/A4	A3	A2	A1

Bits 6 and 5 identify INSERT or ASSEMBLE mode. Bits 4~0 define the channel to be preset.

2-4-4 REMOTE data

This 8-bit data indicates the device status.
Controller connected: bit 0 = 1
Controller not connected: bit 0 = 0

	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
STARAT→	–	–	–	–	–	–	PRE ROLL END	REMOTE

DATA S→E format

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
		Counter data			RS-422 status				System Control status	
Header "FF"	ID Hours Linear time counter "D" 1000's 100's Reel counter "0~9"	Minutes 10's 1's	Seconds NOP	Frame NOP	DATA 0	DATA 1	DATA 2	DATA3	CMND 1	CMND 2
Tape remaining A:T-120 B:T-160	ID Hours A or B	Minutes	NOP	NOP						

DATA E→S format

[1]	[2]	[3]	[4]
	Command data		
Header "FF"	EDIT PRESET	REMOTE	E.CHD

[TABLE 4] EDIT DATA FORMAT (EDIT→SYSCON)

Low order / High order	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	POWER FAILURE				POWER OFF	POWER ON										
1						POWER TOGGLE										F.ADV
2	STOP	KEYOFF	REWIND	FF			PAUSE TOGGLE		RECORD		PLAY			MEMORY TOGGLE		SLOW
3	REVIEW	CUE	EJECT				T160/ 120 TOGGLE			COUNTER RESET			V.DUB	A.DUB		NOP
4	SHUTTLE PLAY 0	SHUTTLE SLOW +5	SHUTTLE SLOW +10	SHUTTLE SLOW +20	SHUTTLE SLOW +30				SHUTTLE PLAY +1	SHUTTLE PLAY +2	SHUTTLE PLAY +3	SHUTTLE PLAY +5	PREVIEW	PREROLL		EDIT ON
5		SHUTTLE SLOW -5	SHUTTLE SLOW -10	SHUTTLE SLOW -20	SHUTTLE SLOW -30				SHUTTLE PLAY -1		SHUTTLE PLAY -3	SHUTTLE PLAY -5	EDIT PRESET	CUE UP WITH DATA	AUTO EDIT	EDIT OFF
6	JOG PLAY 0	JOG SLOW +5	JOG SLOW +10	JOG SLOW +20	JOG SLOW +30				JOG PLAY +1	AUTO REPEAT OFF	AUTO REPEAT START	AUTO REPEAT END	REEL COUNTER ON	REMAIN ON		LINEAR TIME COUNTER ON
7		JOG SLOW -5	JOG SLOW -10	JOG SLOW -20	JOG SLOW -30				JOG PLAY -1		FULL EE ON	FULL EE OFF	SELECT EE ON		REC·MON ON	Unused

2-5.PIN SPECIFICATIONS OF SYSTEM CONTROL MICROPROCESSOR

Pin No	Name	I/O	Function
1	MUTE	0	Inhibits write in CTL and AUDIO linear tracks. Recording inhibited : Hi
2 3	LM 1 LM 2	0 0	Loading motor control signals

Loading motor matrix

	Stop	Load	Unload	Brake
LM 1	Lo	Hi	Lo	Hi
LM 2	Lo	Lo	Hi	Hi

Pin No	Name	I/O	Function
4	REVERSE	0	Capstan motor reversing control signal Reversing : Hi
5 6 7	MODE 1 MODE 2 MODE 3	I I I	Operating mode of mechanism

Mechanism mode sensor matrix

POSITION	EJECT	STOP	FF/REW	REC PAUSSE	PREVIEW	PLAY/REC	F.SLOW	TRANSIENT
MODE 1	Hi	Hi	Hi	Hi	Lo	Lo	Lo	Lo
MODE 2	Hi	Hi	Lo	Lo	Hi	Hi	Lo	Lo
MODE 3	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo

Pin No	Name	I/O	Function
8	ASMBL	0	Assemble control signal. Assemble mode : Hi
9	M.CUT	0	Inhibits VIDEO/Hi-Fi AUDIO recording. Recording inhibited : Hi
10	EE	0	EE/PB select signal. EE: Hi, PB: Lo
11	TRANSIENT	0	DA4 switching control signal DA4: Hi
12	FLSW 2	I	FLSW 2 input
13	Vdisp	-	GND
14	DEW	I	Input on detection of condensation. When condensation detected : Hi
15	$\overline{\text{A.DUB}}$	0	A.DUB mode signal. A.DUB mode : Lo
16	CTL	I	CTL signal
17	SW30	I	SW30 signal
18	$\overline{\text{V.DUB}}$	0	V.DUB mode signal. V.DUB mode : Lo
19 20 21 22 23	RM 1 RM 2 RM 3 RM 4 RM 5	0 0 0 0 0	Reel motor control D/A signals
24	LOAD	0	LOAD terminal for communication with EDIT μP
25	CM.BRAKE	0	Capstan motor brake signal. Capstan stopped : Hi
26	VCC	-	5V power source
27	CFG/RFG	I	Capstan motor FG/Reel motor FG In REC: Capstan motor FG Otherwise: Reel motor FG
28	BUSY IN	I	Input of the state in which the capstan/cylinder motor speed controls are switched off.
29	SAVE	I	Camera POWER SAVE signal
30	DATA E→S	I	Data from EDIT μP to SYSTEM CONTROL μP
31	DATA S→E	0	Data from SYSTEM CONTROL μP to EDIT μP

Pin No	Name	I/O	Function
32	S.CLK	0	Communication between SYSTEM CONTROL and EDIT μPs
33	END LED	0	Indicates END LED is light
34	$\overline{\text{FE CONT}}$	0	Flying erase head control signal During flying erase (FE) oscillations : Lo
35	$\overline{\text{REEL CUE}}$	0	Tape wound diameter detection control signal for servo. When winding diameter detected : Lo
36	$\overline{\text{FF/REW MODE}}$	0	Servo FF/REW control signal. During FF/REW : Lo
37	$\overline{\text{REEL MODE}}$	0	Servo reel mode control signal. In reel mode : Lo
38	REEL REVERSE	0	Reel motor reversing control signal. When reversed : Hi
39	ESS	I	Supply end sensor signal (pulse)
40	EST	I	Take-up end sensor signal (pulse)
41	T.REEL	I	Take-up reel pulse signal
42	S.REEL	I	Supply reel pulse signal
43	RESET	I	Reset signal
44	VCC	-	5+/-0.5V power source
45 46		- -	Connects to clock oscillator
47	VSS	-	GND
48	FL SW1	I	Comes in when cassette stage position is detected
49	TAB	I	TAB presence/absence signal
50	C.PAUSE	I	Camera pause signal. During camera pause : Hi
51	V.SYNC	I	V SYNC signal
52	CLOCK	0	Clock for expanded port
53	DATA	0	Data for expanded port
54	STROBE	0	Strobe for expanded port
55	$\overline{\text{PF}}$	I	Power failure signal. During power failure : Hi
56	S/S HIGH	I	Comes in while capstan motor is driving during SLOW. When the capstan is driven : Hi
57	DM SWAY 1	0	To prevent sway during SLOW, Accelerates cylinder Forward slow cylinder acceleration : Hi
58	DM SWAY 2	0	Decelerates cylinder Reverse slow cylinder deceleration : Lo
59	SLOW ACCEL	0	Rises to start capastan motor during SLOW (Hi)
60	SLOW/PAUSE	0	SLOW/PAUSE mode signal : Hi
61	SLOW BRAKE	0	Rises to brake capastan motor during SLOW (Hi)
62	PLAY	0	PLAY mode signal : Hi
63	REC	0	REC mode signal : Hi
64	POWER CONT	0	Power control signal : Hi

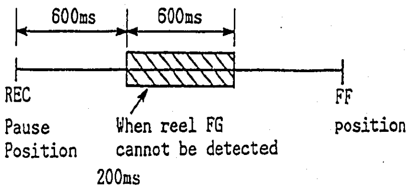
2-6.Outputs through the expanded port

Pin No	Name	I/O	Function
1	STROBE	I	
2	DATA	I	
3	CLOCK	I	
4	SEARCH	0	SEARCH mode signal
5	QUICK	0	QUICK mode signal
6	REC MON	0	REC MONITOR signal
7	TAPE END	0	TAPE END signal
8	VSS	-	GND
9	Unused		
10	Unused		
11	PLL OFF	0	Servo reference choice Lo : DIGITAL REF30, Hi : Divided from fixed FSC
12	DIGITAL	0	TBC ON/OFF signal
13	L.MUTE	0	Audio muting signal
14	REC ALARM	0	Camera: REC.TALLY Output control
15	OUTPUT ENABLE	0	
16	VCC	-	5V power source

2-7.Timers

Mode	Duration	Operation
STILL	5 min.	STILL begins after 6 frames are fed.
SLOW	5 min. forward 5 min. reverse	PLAY
REC PAUSE	5 min.	POWER SAVE ·Pressure roller will be released. ·REC will start as soon as PAUSE is released.

2-8.Troubleshooting

<table>
<tr><th>Symptom</th><th>LCD</th><th>AUTO OFF</th><th>Mode after recovery</th><th>Operation</th></tr>
<tr><td>Cylinder locked up</td><td>CYL L</td><td>—</td><td>STOP</td><td>SW30 does not rise/fall for 120 ms.</td></tr>
<tr><td>Reel locked up</td><td>REEL L</td><td>—</td><td>STOP</td><td><table>
<tr><th>Mode</th><th>REEL FG</th><th>TAKE UP REEL PULSE</th></tr>
<tr><td>PLAY</td><td>1sec</td><td>5sec</td></tr>
<tr><td>SEARCH
SHUTTLE Duble mode or faster</td><td>200msec</td><td>1sec</td></tr>
<tr><td>SLOW
JOG 1/5~1/30
SHUTTLE 1/5~1/30</td><td>2sec</td><td>—</td></tr>
</table></td></tr>
<tr><td>Tape loading</td><td rowspan="2">TAPE E</td><td rowspan="2">Flashing</td><td rowspan="2">POWER OFF</td><td>·5-second timeout</td></tr>
<tr><td>Tape unloading</td><td>·5-second timeout
Position shifting direction


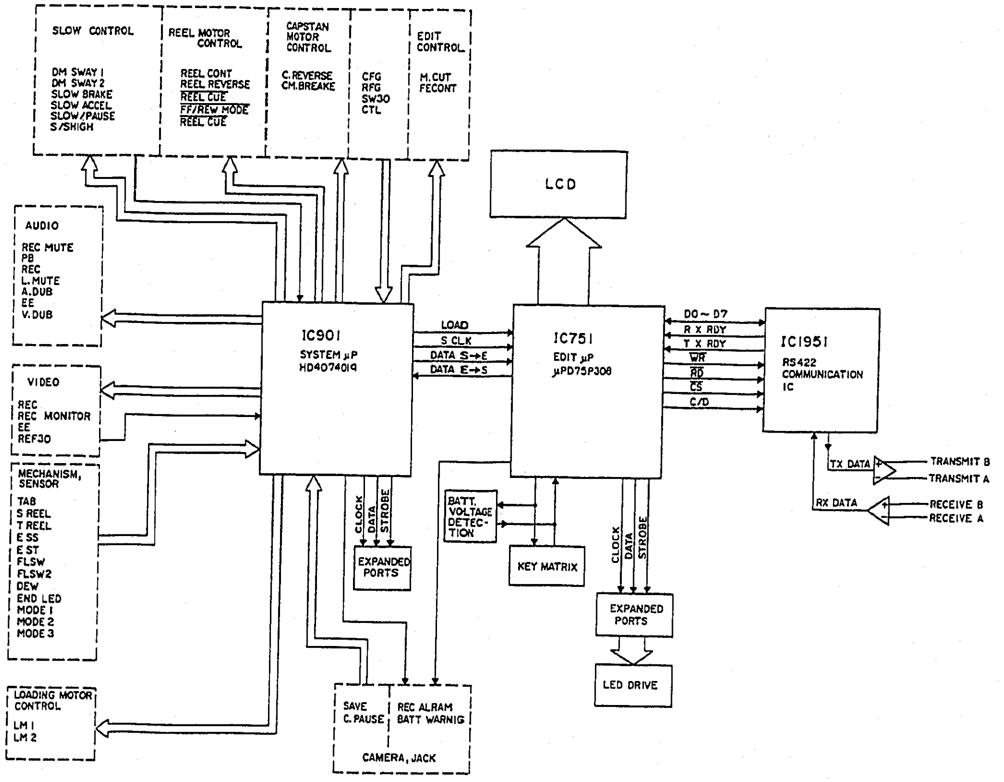
600ms
600ms
REC
Pause
Position
When reel FG
cannot be detected
200ms
FF
position

</td></tr>
<tr><td>Cassette load/unload</td><td>CASS E</td><td>Flashing</td><td>POWER OFF</td><td>·5-second timeout
·Cassette load−〈Trouble〉→Unload−〈Trouble〉→Load−〈Trouble〉→POWER OFF
·Cassette load−〈Trouble〉→Load−〈Trouble〉→Unload−〈Trouble〉→POWER OFF
·If REEL FG disappears for 200 msec, system regards the case as trouble.</td></tr>
</table>

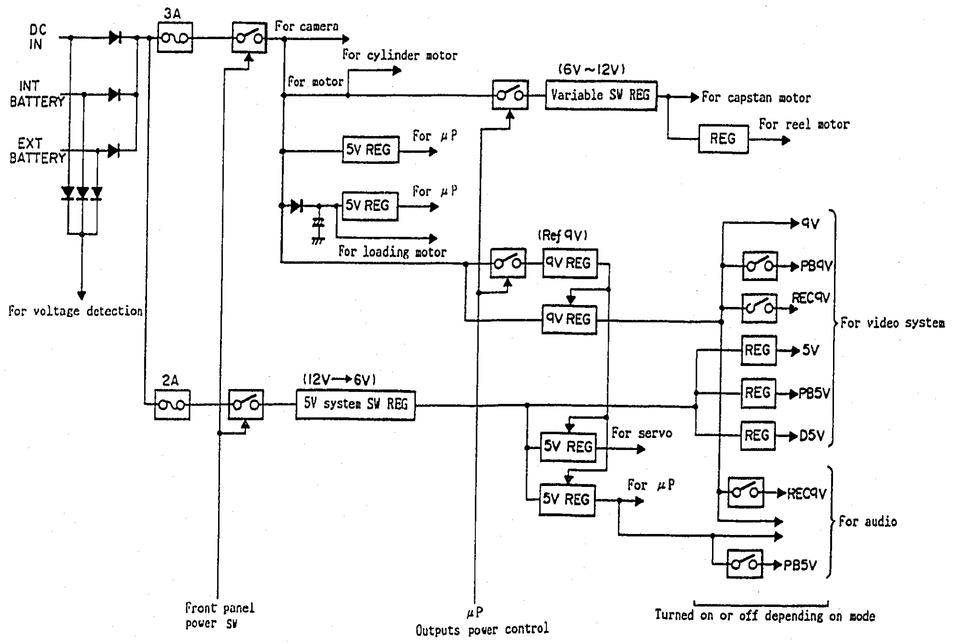
Operating modes of mechanism and servo

<table>
<tr><th>Mode</th><th>EJECT</th><th>PLAY</th><th>REC</th><th>CUE</th><th>REVIEW</th><th>STILL</th><th>REC PAUSE</th><th>SLOW</th></tr>
<tr><td>Mechanism</td><td>EJECT</td><td colspan="2">PLAY</td><td>PLAY</td><td>REVIEW</td><td colspan="3">STILL</td></tr>
<tr><td>Reel motor control</td><td>F.FWD/REW</td><td colspan="2">Tape diameter</td><td>Reel</td><td>Reel</td><td></td><td></td><td>Reel</td></tr>
</table>

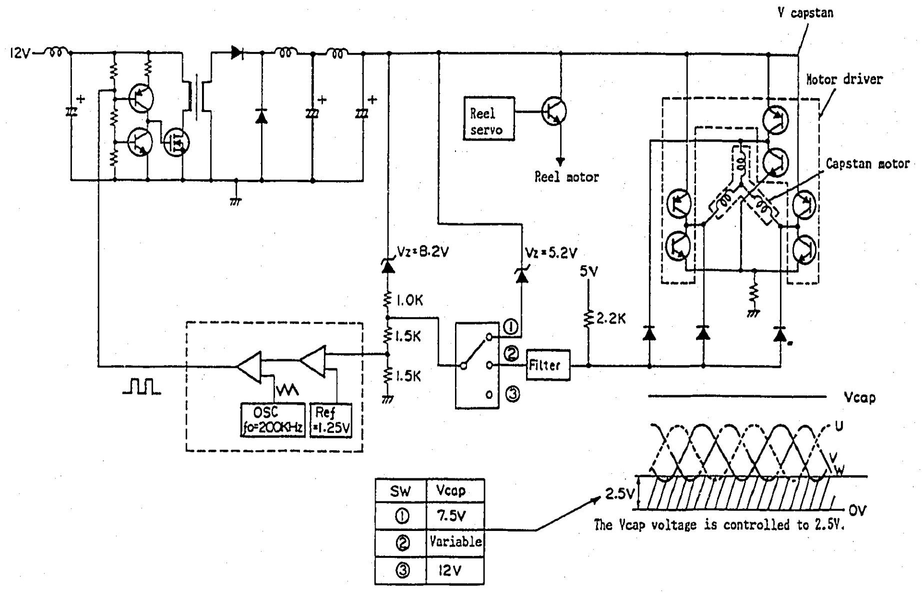
<table>
<tr><th>Mode</th><th>JOG+ 1time (SP speed)</th><th>Except JOG +1time</th><th>+1/5~1/30
SHUTTLE -1/5~1/30
1time (SP speed)</th><th>SHUTTLE +1time</th><th>SHUTTLE +2times
SHUTTLE +3times
SHUTTLE +5times</th><th>SHUTTLE -1time
SHUTTLE -3times
SHUTTLE -5times</th></tr>
<tr><td>Mechanism</td><td colspan="3">STILL</td><td colspan="2">PLAY</td><td>REVIEW</td></tr>
<tr><td>Reel motor control</td><td>Winding diameter</td><td colspan="5">REEL</td></tr>
</table>


SLOW CONTROL
DM SWAY 1
DM SWAY 2
SLOW BRAKE
SLOW ACCEL
SLOW/PAUSE
S/SHIGH
REEL MOTOR CONTROL
REEL CONT
REEL REVERSE
REEL CUE
FF/REW MODE
REEL CUE
CAPSTAN MOTOR CONTROL
C.REVERSE
CM.BREAKE
CFG
RFG
SW30
CTL
EDIT CONTROL
M.CUT
FECONT
LCD
AUDIO
REC MUTE
PB
REC
L.MUTE
A.DUB
EE
V.DUB
VIDEO
REC
REC MONITOR
EE
REF30
MECHANISM, SENSOR
TAB
S REEL
T REEL
E SS
E ST
FLSW
FLSW2
DEW
END LED
MODE 1
MODE 2
MODE 3
LOADING MOTOR CONTROL
LM 1
LM 2
IC901
SYSTEM μP
HD4074019
LOAD
S CLK
DATA S→E
DATA E→S
IC751
EDIT μP
μPD75P308
D0~D7
R X RDY
T X RDY
WR
RD
CS
C/D
IC1951
RS422
COMMUNICATION
IC
TX DATA
TRANSMIT B
TRANSMIT A
RX DATA
RECEIVE B
RECEIVE A
CLOCK
DATA
STROBE
EXPANDED PORTS
BATT. VOLTAGE DETECTION
KEY MATRIX
CLOCK
DATA
STROBE
EXPANDED PORTS
LED DRIVE
SAVE
C.PAUSE
REC ALRAM
BATT WARNIG
CAMERA, JACK

SYSTEM CONTROL BLOCK DIAGRAM


DC IN
INT BATTERY
EXT BATTERY
For voltage detection
3A
For camera
For cylinder motor
For motor
(6V~12V)
Variable SW REG
For capstan motor
REG
For reel motor
5V REG
For μP
5V REG
For μP
For loading motor
(Ref 9V)
9V REG
9V REG
9V
PB9V
REC9V
For video system
REG
5V
REG
PB5V
REG
D5V
2A
(12V→6V)
5V system SW REG
5V REG
For servo
5V REG
For μP
REC9V
PB5V
For audio
Front panel power SW
μP
Outputs power control
Turned on or off depending on mode

POWER SUPPLY BLOCK DIAGRAM



SW	Vcap
①	7.5V
②	Variable
③	12V

The Vcap voltage is controlled to 2.5V.

POWER SUPPLY (Vcap)

3. DIGITAL PROCESSING CIRCUITS (DIG board and Part of ENC Board)

3-1. Color decoder (IC705)

The decoded color difference signals (IC705 pins 18 and 19) pass the following before entering ADC block (IC706, IC707 etc.)
- LPFs (R780/C752, R791/C754)
- Phase equalizers (Q718-719, Q721-722, etc.)
- Matrix compensators (RT705-706, Q720, Q723, etc.)

3-2. ADC

3-2-1 Luminance signal

The luminance signal passes the following before entering the AD converter (IC701).
It is an 8-bit signal sampled at 14.3 MHz.
- Active filters (Q701/C702, etc.)
- Feedback clamps (Q702-704/C704, etc.)
- Dark clip (Q902, etc.)

IC721 generates a reference voltage for the AD converter.

3-2-2 Chroma signals

The color difference signals pass the following before entering the AD converter (IC707).
- Amplifiers (Q707-708, Q712-713, etc.)
- Feedback clamps (Q709-711, Q714-716, etc.)
- Color difference signals time-sharing switches (IC706, R796)

The color difference signals are sampled at 560 nsec and time-shared in such a manner that R-Y and B-Y enter the AD converter alternately every 280 nsec. They are 8 bits.

3-3. PLAY clock generator

- Phase comparator (trapezoidal wave generator, Q725-728, etc.)
- Operational amplifiers (IC713, IC714, etc.)
- VCO (Q7290-730, D705, IC733, etc.)
- VD detector (1/2 of IC723, etc.)

The VCO output returns to the phase comparator from the gate array (IC702) which divides the signal into a phase-locked horizontal pulse.

The PLL initializes its divider immediately after vertical signal for fast response against skew across the top of the screen. The initialization phase is determined with a monostable multivibrator (1/2 of IC715).

3-4. Reference sync/clock generator

3-4-1 Sync/clock

- Phase comparator (trapezoidal wave generator, Q731-735, etc.)
- Operational amplifiers (IC718, etc.)
- Free-run voltage generator (R840-841, C796)
- Switch (IC717)
- VCO (Q736-737, IC732, X703, etc.)
- SSG (IC716)
- VD detector (1/2 of IC723, etc.)
- Signal detector (D708, R878, R879, C914, part of IC702, part of IC713, etc.)

The VCO output returns to the phase comparator from the gate array (IC702) which divides the signal into a phase-locked horizontal pulse.

SSG, included in the PLL, generates a sync signal, which is GENLOCKed to the video signal supplied to the VCR. If the video signal does not come in, the switch (IC717) will be operated so that the VCO runs freely.

To select GENLOCK or free run mode automatically, presence of the input video signal is detected from the peak rectified voltage of sync signal and killer voltage of REC Chroma APC.

3-4-2 Servo REF

IC717, IC719, Q738, Q739.

Delivered as the reference signal of servo is, during REC and GEN LOCK, the sync signal separated from input video signal and, during free run, the sync signal of SSG.

3-4-3 Subcarrier

- Phase shifter 1 (1/2 of IC722, IC725, IC726, etc.)
- Phase shifter 2 (1/2 of IC722, IC725, etc.)
- Switch (IC724)
- Filter (R900, L722, C846, Q744, etc.)

These produce the subcarrier used in the color encoder.

The phase shifter 1, controllable with the front-panel SC control, permits to adjust its phase to the subcarrier phase of the input video signal during GEN LOCK.

The phase shifter 2 adjusts the sub screen to the EE picture of the main screen during simultaneous monitor and the switch selects the subcarrier of SSG during free run.

3-5. Memory and gate array

3-5-1 Memory

- Line memory (IC703: HM63021) for luminance TBC
- Line memory (IC711: HM63021) for color TBC
- Line memory (IC704: HM63021) for luminance 1H delay
- Filed memory (IC708, OC709: HM53461ZP) for chroma noise reducer (CNR)

3-5-2 Gate array

For TBC (IC702: HG62E58R29FS)
(1) Error detection of luminance/chroma feedback clamp
(2) H/V counter for clock generator
(3) TBC/1H delay line memory control
(4) Luminance blanking
(5) Window gate generator for sub screen during simultaneous monitor

For CNR (IC710: HG62E43R24FS)
(1) Field memory control
(2) CNR processing
(3) Chroma blanking

3-6. DAC

- DA converters (IC712: HD49304)
- Active filters (Q504, Q512, Q517)
- Luminance amplifier (Q505, Q506)
- Clamp, sync replace (C510, Q508, Q509, RT503, etc.)
- R-Y amplifier (Q513, Q514, etc.)
- B-Y amplifier, burst adder (Q515, Q516, RT512, etc.)

Three DA converters are included in the IC712.

After DA conversion, the luminance signal passes the active filter (Q504, etc.), clamp and sync replace (C510, Q508, Q509, RT503, etc.) before coming to the output switch.

R-Y passes the active filter (Q512, etc.) and amplifier (Q513, Q514, etc.), and B-Y passes the active filter (Q517) and burst adder amplifier (Q515, Q516, etc.) Then they come to the chroma encoder.

3-7. Chroma encoder (ENC Board)

Chroma encoder IC (IC504, HA11720), and 90° phase shifter (Q518, Q519)

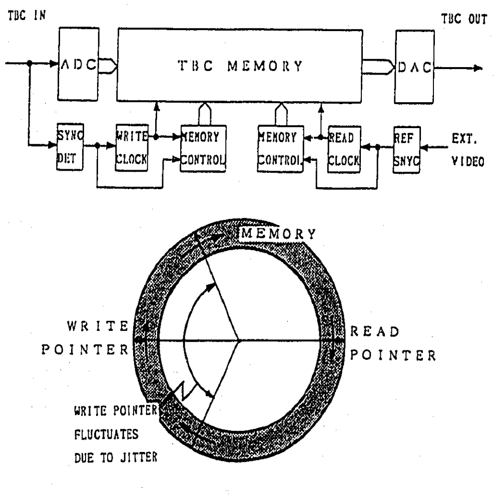
This modulates the color difference signals before supplying them to the output switch.

3-8. Output process (ENC Board)

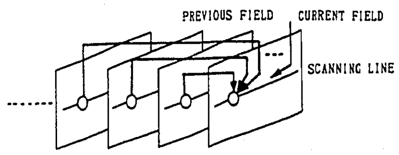
- Clamp (Q501, Q502, Q503, C504, ect.) for EE signal
- Switches (IC501, IC503: HA118059, part of IC502: HA118104)
- Drive amplifiers (part of IC502, Q510, Q512, etc.)

An appropriate video signal will be selected according to the mode of VCR. IC501, IC503 and IC502 have three 2-input/1-output switches. In IC502, 6dB amplifiers capable of driving 75Ω follow each switches. YC addition is done to obtain composite (VBC) signal using the amplifier.

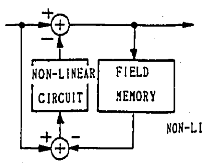
Principle of TBC



Principle of CNR


PREVIOUS FIELD
CURRENT FIELD
SCANNING LINE

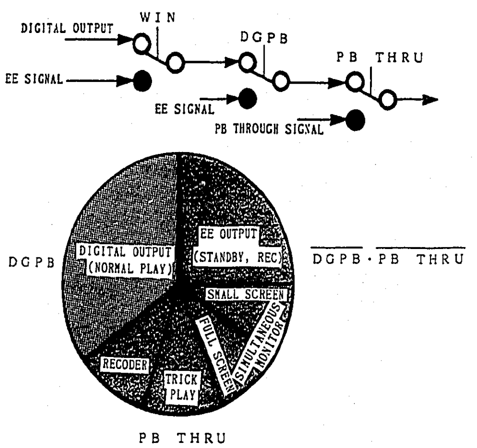
OUTPUT $x_0 = (1-K) \times (x_0 + K x_{-1} + K^2 x_{-2} + K^3 x_{-3} + \cdots\cdots)$


NON-LINEAR CIRCUIT
FIELD MEMORY

NON-LINEAR CIRCUIT:
STOPS NR AT TIME OF TRANSIENTS

SYSTEM OUTPUT

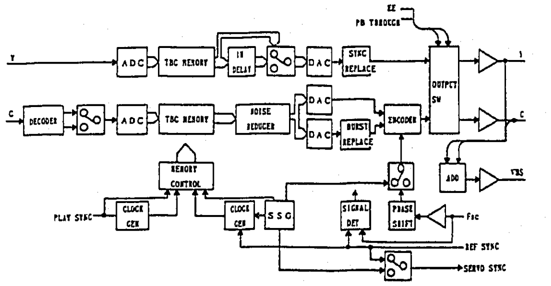
Video Signal

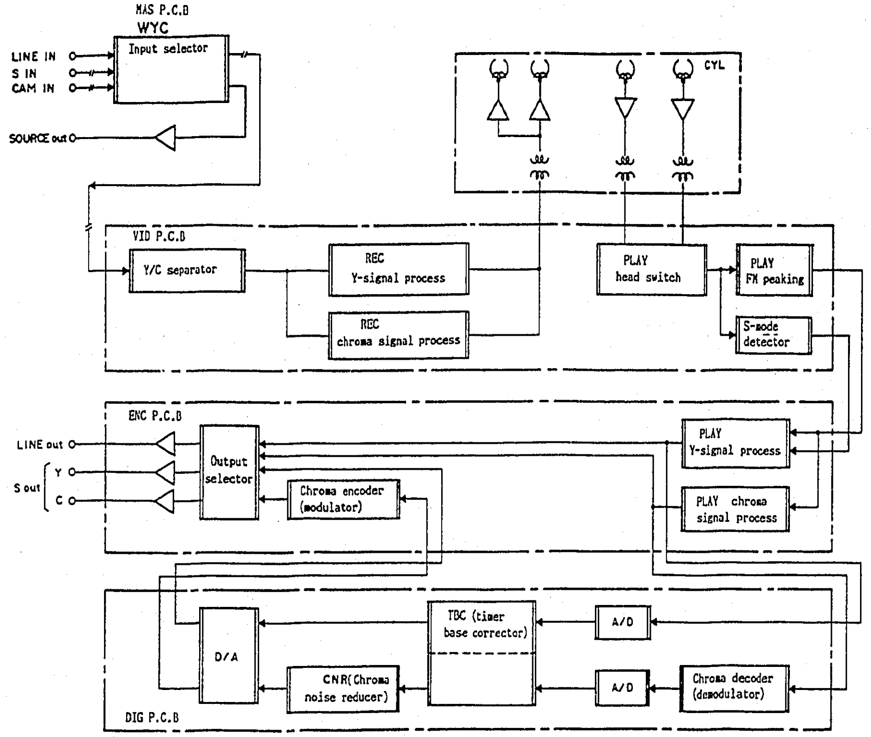

DIGITAL OUTPUT
EE SIGNAL
W I N
D G P B
P B THRU
EE SIGNAL
PB THROUGH SIGNAL
D G P B
DIGITAL OUTPUT (NORMAL PLAY)
EE OUTPUT (STANDBY, REC)
SMALL SCREEN
SIMULTANEOUS MONITOR
FULL SCREEN
TRICK PLAY
RECODER
D G P B · P B THRU
P B THRU

Control Inputs

MON. SYS: Simultaneous monitor mode
EE. SYS: EE output mode
TRICK. SYS: Trick play mode
SPLIT. PANEL: Small screen in simultaneous mode
EDIT. PANEL: Setting of edit system
GENLOCK. PANEL: Turns on to set the recorder.
Turns off to set the player.

CONFIGURATION OF DIGITAL SECTION


Y
C
DECODER
ADC
TBC MEMORY
1H DELAY
DAC
SYNC REPLACE
NOISE REDUCER
BURST REPLACE
ENCODER
OUTPUT SW
EE
PB THROUGH
ADD
Y
C
VBS
MEMORY CONTROL
PLAY SYNC
CLOCK GEN
SSG
SIGNAL DET
PHASE SHIFT
Fsc
REF SYNC
SERVO SYNC


MAS P.C.B
WYC
Input selector
LINE IN
S IN
CAM IN
SOURCE out
CYL
VID P.C.B
Y/C separator
REC Y-signal process
REC chroma signal process
PLAY head switch
PLAY FM peaking
S-mode detector
ENC P.C.B
LINE out
S out
Y
C
Output selector
Chroma encoder (modulator)
PLAY Y-signal process
PLAY chroma signal process
D/A
TBC (timer base corrector)
A/D
CNR (Chroma noise reducer)
A/D
Chroma decoder (demodulator)
DIG P.C.B

DIGITAL SECTION BLOCK DIAGRAM

4. CIRCUIT BOARDS

IPP [Interface Power Part]
P.C.B intervening MAS P.C.B and cylinder
·Flying erase oscillator
·Amplifier control (REC/PLAY) in cylinder, and power supply

PBK [Power Backup]
Backup power supply and V.SYNC generator (reference video)
External reference signal discriminator during edit
IC2601: Produces vertical sync signals of 60 and 30 Hz from composite sync signal (pin 1).
Purpose: For framing servo, produces vertical sync signal of 30 Hz (V.SYNC of odd video fields only) and supplies it to the servo IC.
IC2602: Checks synchronization with external input signal and, if it is +/-1.5H apart from standard NTSC signal, sets servo mode in free-run mode instead of external sync mode.
(Only in PLAY mode with an edit controller connected)

REG [Regulator]
Power supply generating 12 and 5.6 V
IC801: Switching regulator producing 5.6 V

FSW [Front Switch]
Control of function key input and display output
IC751: EDIT μP
Detects key input.
Drives display and indicator.
Capable of communicating with system control μP and through RS-422 (REM).

REM [Remote]
RS-422 reception circuit
IC1955: Current-voltage converter
IC1956: Remote 1/2 input switch
IC1954: Reference clock divider for RS-422 baud rate
98006 ←→ 38.4 kHz
49006 ←→ 19.2 kHz
IC1951: RS-422 interface

MAS [Master]
REG ··· 9V power supply for video circuits & audio circuits
5V power supply for control circuits
Capstan motor drive power source
IC802: Switching regulator producing capstan motor drive power. Receiving feedback of motor power, controls supply power according to load.
IC803: Regulator producing 9 V for video circuits. 9 V will be generated from 12 V when power switch is on.

JACK ··· Circuits around the jack for external device
IC701: Detects POWER SAVE.
Detected POWER SAVE will be sent to the system control μP.

SYSTEM CONTROL ··· Mode control of mechanisms and electrical circuits
IC901: System control μP
Controls mechanisms and electrical circuits.
Detects faults and protects mechanisms.
IC903: Loading motor driver
Drives motor, receiving signals from system control μP that detects mechanism mode from mechanism state switch.
IC904: Tape end detection
Detects signals from end sensors and sends them to system control μP.
IC905: Condensation detection
Detects condensation from dew sensor and sends signal to system control μP.
IC908: R.FG/C.FG switching circuit
Sends C.FG to system control during REC and R.FG in other modes.
IC909: System control expanded OUT port
IC910: S-VHS LED driver LED lights
·During $\overline{\text{PB}}$, front SW at AUTO with S cassette
·During PB, S video output is Hi

SERVO ··· Control of cylinder and capstan motor rotations
IC601: Controls phase and speed of cylinder and capstan motors.
IC602: Amplifies and shapes pulse signals.
CFG AMP
CTL 30dB AMP
IC603: Controls trick play.
·Pretracking control
·Brake control during intermittent drive like SLOW and STILL
·Generation of additional V pulse
IC604: Capstan motor drive signal amplifier
IC606: Generates reference signal for servo control during TBC ON.
IC607: Adjusts phase of fsc produced in IC606.
IC608: Sets free run mode when PLL is not used and raises PLL turn-on speed.
IC609: TACH MM of Rec Monitor head, Hi-Fi head, and flying erase head.
IC611: Selects fsc (reference signal of servo). Selects fsc produced in IC606 or fsc produced in video process circuit (fsc produced in IC606 will be selected during TBC ON).
IC613: Produces signals used for timing control. SW30 generator for Rec Monitor head, Hi-Fi head, and flying erase head. (They are out of phase by 60° each.)

AUDIO ··· Linear and Hi-Fi audio rec/play circuits
Dolby B system is incorporated.
IC401L/R: Linear audio rec/play circuits. Incorporates ALC, AMP and MUTE functions.
IC402: Linear audio CH-2 input selector. Selects MIC or LINE input.
IC403: Linear audio CH-1 input selector. Selects MIC or LINE or CAMERA input.
IC404: CH-1/2 LINE input amplifier
IC405: CH-1/2 MIC input amplifier
IC406: Camera audio input amplifier
IC421: 2-channel Dolby encoder/decoder
IC451: TIME code signal input amplifier
IC503: Input/output selector of Hi-Fi and linear audio rec/play
IC502: FM modulates/demodulates audio signal for Hi-Fi audio rec/play. Incorporates

PNR (peak noise reduction).
IC501: Hi-Fi audio rec/play amplifier
Incorporates PLAY AGC.

WYC ··· Video block on MAS P.C.B
Input video signal selector and interface of VID, ENC and DIG P.C.Bs
IC201: Generates control signal for video signal selection.
·S-terminal input
·Delivers Hi during Y/C mode with camera input.
IC202: Selects luminance signal and input.
At CAM, sends CAM Y or VBS to VID.
At S, sends S-terminal input Y to VID.
At CAM+S, sends LINE VBS to VID.
IC203: Selects chroma signal.
In Y/C mode, switches input (like in IC202) and sends C to VID.
In VBS mode, switches VBS signal.

DMD [Drum Motor Drive]
Driving cylinder motor, reel motor and capstan motor.
Detecting rotation of capstan motor.
IC01: Drives cylinder motor.
IC02-04, 10, 12: Drive reel motor.
Perform fixed voltage drive and control speed control mode and tape diameter mode.
IC05-09: Detects capstan motor rotation.
Shapes motor U/V hall outputs and detects direction.

VID [Video Signal Process]
·Video signal recording process
·Y/C separation of input REC video signal.
·REC luminance and chroma signal processing
·REC Y/C mix
·Head switching and FM peaking in PB process
·S-VHS discriminator
HIC2201: HT4921
REC video AGC, keyed clamp, pre-emphasis, FM modulation, filter drive, switching in VHS/S-VHS.
HA118142 IC is used.
IC2201: HA118019NT
Head channel switching of PLAYBACK FM modulated signals by PB SW30.
FM AGC
Head channel switching in trick play (DA-4).
IC2202: VC-2031MP
REC sub emphasis (S-VHS only)
IC2203: HA118064
REC chroma signal processing
(Chroma AGC, frequency conversion, 4-phase rotation)
IC2204: HA118084
Discriminates between VHS and S-VHS during play.
IC2104: MSM6856RS
1H delay CCD
Produces 1H delayed video signal for Y/C separation from VBS VIDEO (LINE IN or CAMERA) input.
IC2105: NJM2240
Produces CCD drive-clock signal of 4fsc.
Input is PLL of chroma 3.58 MHz.
IC2106: HA118059
Video switch that switches between C separated from Y/C input and C coming out of bandpass filter (CP101) of VBS VIDEO signal.
IC2107:
Video switch that switches between Y separated from Y/C input and 2-line separation Y of VBS VIDEO signal.

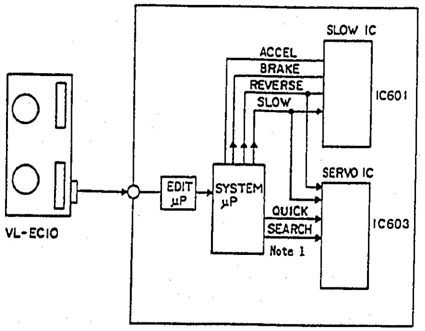
ENC [Encoder]
·PB VIDEO PROCESS of Y and C
·Chroma encoder and video output switches.
COLOR ENC ··· Reference to DIGITAL PROCESSING CIRCUIT (3-7, 3-8)

1)PB VIDEO PROCESS ··· Processing of PLAY luminance and chroma signals
HIC2202: HT4921
HA118124 is used.
FM limiter, demodulator, de-emphasis, S-VHS/VHS filter drive.
DOC switch included.
IC2205: VC2031
Sub de-emphasis (play) of S-VHS
IC2206: MSM6966-2RS
Delay CCD for DO-Compensation.
IC2207: NJM2238
PLL producing 3fsc with chroma fsc as input
2)PB COLOR ···
IN2208: HA18066MP
Converts 4-phase 629-kHz chroma signal to 3.58 MHz.
Performs APC, burst deemphasis and AGC.

5. DESCRIPTION OF SERVO CIRCUIT OPERATIONS

5-1. Jog/Shuttle

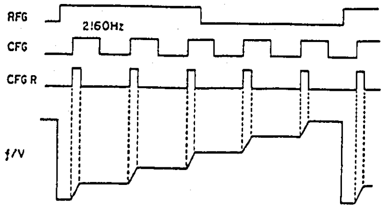
When the jog dial/shuttle ring on the VCR's front panel or on the controller (EC-10) is operated, the tape speed can be changed as shown in Table 1. Fig. 1 shows the flow of the system control signals in each mode.


SLOW IC
ACCEL
BRAKE
REVERSE
SLOW
IC601
SERVO IC
EDIT μP
SYSTEM μP
QUICK
SEARCH
Note 1
IC603
VL-EC10

Quick search and tape speed

QUICK	SEARCH	speed
1	1	×5
1	0	×2
0	1	×3
0	0	×1

Fig. 1 Flow of Signals during Jog/Shuttle Operation


RFG
2.150Hz
CFG
CFG R
f/V

The period of RFG is large at the beginning of take-up and small at the end.

Fig. 3 Signal Waveforms

Table 1 JOG/SHUTTLE Operation Table

IC02 (BA6303)

Mode	Review		Rev	−SLOW				Still	+SLOW				PLAY	Quick	Cue	
Tape speed	-5	-3	-1	-1/5	-1/10	-1/20	-1/30	0	1/30	1/20	1/10	1/5	1	2	3	5
Jog			○	---	---	---	---	---	---	---	---	---	○			
Shuttle	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Front panel	○							○				○	○			○
Search	H	H	L	L	L	L	L	L	L	L	L	L	L	L	H	H
Quick	H	L	L	L	L	L	L	L	L	L	L	L	L	H	L	H
Slow	L	L	L	H	H	H	H	H	H	H	H	H	L	L	L	L
Reverse	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L

Operation key

System control signals

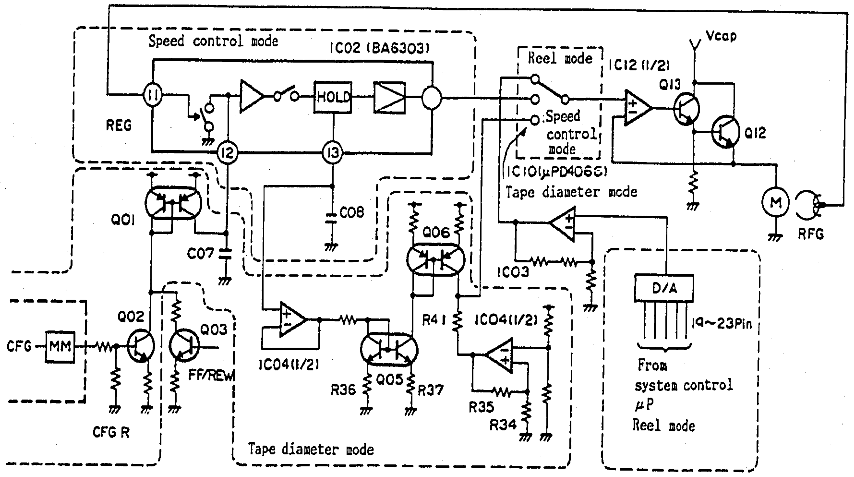

Speed control mode
IC02 (BA6303)
REG
11
HOLD
12
13
C08
Q01
C07
Q06
Reel mode
Speed control mode
IC12 (1/2)
IC10(μPD4066)
Tape diameter mode
Vcap
Q13
Q12
M
RFG
IC03
D/A
19~23Pin
From system control μP Reel mode
CFG
MM
Q02
Q03
FF/REW
CFG R
IC04(1/2)
R41
Q05
R36
R37
IC04(1/2)
R35
R34
Tape diameter mode

Fig. 2 Principle Circuits

5-2. Reel servo block

A reel motor is added to improve performance of tape drive and control. Control modes of the reel motor are as follows.

		Operating mode
1	Tape diameter mode	play
2	Speed control mode	FF/REW, cassette load/ unload, etc.
3	Reel mode	Slow, search, etc.

These modes are explained below.

5-2-1 Tape diameter mode

Purpose: The take-up reel winds the tape at a fixed tension regardless of tape position. This was done conventionally by applying a fixed torque to the reel disk through a mechanical coupling (torque limiter). At this time tape tension varied as the tape was wound and diameter varied as the following equation shows.

$F=T/r$

where F: tension, T: torque, r: radius

Particularly at the beginning of take-up (r is small), the tension would be large and that tape be likely to suffer. So, it is necessray to take up the tape at a fixed tension regardless of tape position.

Principles: To keep the tape tension fixed while it is taken up, it is necessary to detect the tape radius. The tape radius is detected using the following relations.

$v = r\omega$

From this, we have the following.

$r = v/\omega \propto fCFG/fRFG = fCFG \times TREG$

where fCFG: capstan motor FG frequency
fRFG: reel motor FG frequency

Using this relation, the tape radius can be found from fCFG/fRFG.

fCFG/fRFG can be obtained as follows.

① Get CFG R of 65μ wide in time with the rising edge of CFG.
② Charge C07 from Q01 only when CFG R is H.
③ Get f/v (step voltage) from Fig. 3.
f/v is proportional to the period TRFG of RFG and fREG. From this, you can obtain fCFG/ fREG.

5-2-2 Speed control mode (FF/REW)

Q03 is turned on. The capstan is stationary during FF/REW. Q02 is off and current flows to C07 only through Q03.

Unlike in tape diameter mode, triangular waves are sample-held and applied to the reel motor.

Speed is set as fRGF ≒ 11 kHz.

5-2-3 Reel mode

5-bit data (pins 19-23 of system control μP) is D/A converted and tripled by IC03 and applied to the reel motor.

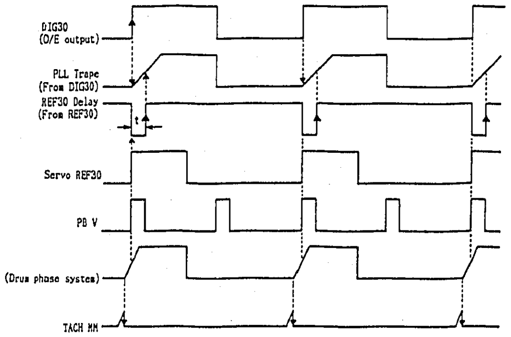
Voltage and timing are controllable from the system control μP.

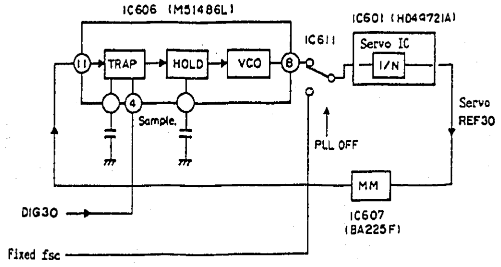
5-3. Fsc PLL LOCK

Purpose: To equalize the phase of PLAY(X1) reproduced picture's VD with the phase (DIG30) of TBC reproduced picture's VD. During PLAY, the rising edge of servo REF30 is the phase of reproduced picture's VD and the rising edge of DIG30 is the phase of TBC picture's VD.

The PLL is formed to equalize their phases as shown in the diagram below. The PLL operates only during PLAY and not during trick PLAY. IC611 switches between fixed Fsc and PLL Fsc. IC607MM prevents the lock phase of servo REF30 from drifting by component (t) of the PLL trapezoid wave.

fcs PLL Lock phase

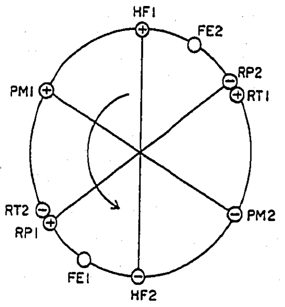




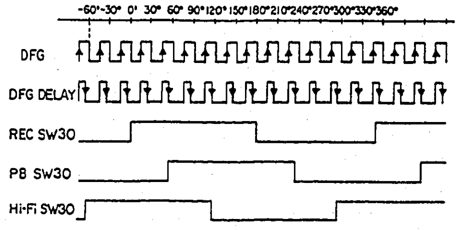
5-4. SW30' generation

Purpose: To generate switching pulse for Hi-Fi / REC monitor/Flying Erase. It is necessary that HSW (DA4) for REC be generated in the servo IC but the other HSWs be generated outside the IC. DFG is generated as a shift pulse in a shift register in IC613.

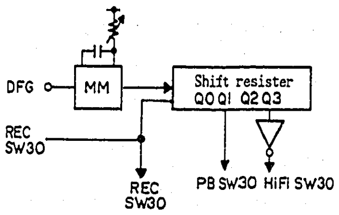
(1) Head arrangement


HF1
FE2
RP2
RT1
PM1
RT2
RP1
FE1
HF2
PM2

(2) Timing diagram


-60° -30° 0° 30° 60° 90° 120° 150° 180° 210° 240° 270° 300° 330° 360°
DFG
DFG DELAY
REC SW30
PB SW30
Hi-Fi SW30

(3) Circuit


DFG
MM
Shift resister
Q0 Q1 Q2 Q3
REC SW30
REC SW30
PB SW30
HiFi SW30

5-5. Framing servo

Purpose: To determine the start and end fields of writing video signal at a joint of different scenes so that skew should not occur.

Principles: This is realized as follows.

① V SYNC (VD30) of an odd field is applied to the servo IC during REC.

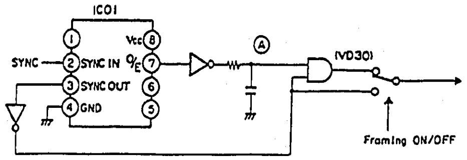
② The timing of starting and ending writing is synchronized with SW30 of REC.

In ①, the record head is timed with the video signal field. When VD30 comes in, the servo IC will lock at CH1 (Lo) of REC SW30 so that the record head can be timed with the video signal field.

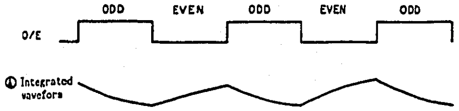
Generation of VD30 is explained below. IC01 (PBK P.C.B) detects ODD/EVEN of video signal. The output and V SYNC are gated to obtain VD of 30 Hz (VD30).

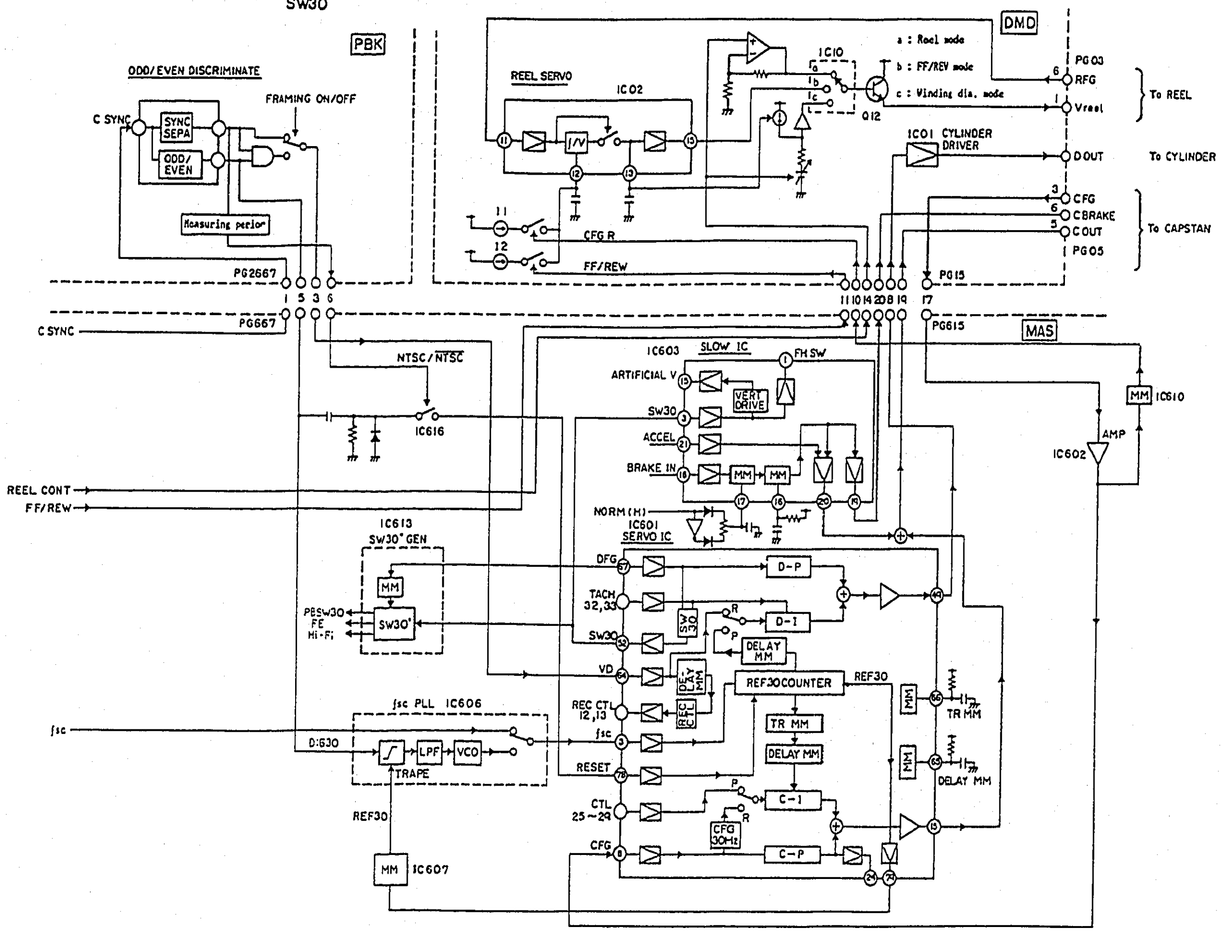
In ②, the recoording start/end are synchronaized with REC SW30. This makes it possible to start and end recording always at a fixed recording head, that is the field.

(1) Circuit


IC01
SYNC
① Vcc ⑧
② SYNC IN O/E ⑦
③ SYNC OUT ⑥
④ GND ⑤
Ⓐ
(VD30)
Framing ON/OFF

(2) Signal waveforms


ODD
EVEN
ODD
EVEN
ODD
O/E
Ⓐ Integrated waveform


PBK
DMD
MAS
ODD/EVEN DISCRIMINATE
C SYNC
SYNC SEPA
ODD/EVEN
FRAMING ON/OFF
Measuring period
PG2667
PG667
C SYNC
NTSC/NTSC
IC616
REEL CONT
FF/REW
REEL SERVO
IC02
IC10
Q12
a : Reel mode
b : FF/REV mode
c : Winding dia. mode
PG03
RFG
Vreel
To REEL
IC01 CYLINDER DRIVER
DOUT
To CYLINDER
CFG
CBRAKE
COUT
PG05
To CAPSTAN
CFG R
FF/REW
PG15
PG615
IC603 SLOW IC
ARTIFICIAL V
VERT DRIVE
FH SW
SW30
ACCEL
BRAKE IN
MM
NORM (H)
IC601 SERVO IC
IC610
AMP
IC602
IC613 SW30' GEN
MM
SW30'
PBSW30
FE
Hi-Fi
DFG
TACH 32,33
SW30
VD
REC CTL 12,13
fsc
RESET
CTL 25~29
CFG
D-P
D-I
DELAY MM
REF30 COUNTER
REF30
TR MM
DELAY MM
C-I
CFG 30Hz
C-P
fsc PLL IC606
D:630
LPF
VCO
TRAPE
REF30
MM
IC607
fsc

6. ASSEMBLY RECORDING

6-1. Assembly recording control
(without a controller)

1. Recording and recording pause

(1) When the PAUSE button is pressed during recording, the system control μP sets the following signals to "Hi" synchronized with the SW30 signal.
 (a) LOAD (system control μP pin 1)
  ··· Signal to inhibit writing of the REC CTL signal.
 (b) MUTE (system control μP pin 9)
  ··· Signal to inhibit writing of video signal.
 (c) Transient (system control μP pin 11)
  ··· Signal to inhibit writing of Hi-Fi audio signal.
 The system control μP then resets the CFG counter (which displays the amount of tape rewound) and applies a short brake to the capstan.
(2) The system control μP checks that the capstan stops from the CFG pulses. It judges that the capstan stops when 8 CFG pulses are not input for 200ms. The capstan is reversed after being stopped.
(3) The system control μP counts the amount of tape necessary for assembling (approx. 1.2 s), monitoring the CFG counter. When the amount is secured, the μP applies a short brake to the capstan to stop it and the VCR enters the standby mode.
(4) When the PAUSE button is pressed again, the system control μP outputs the ASSEMBLE signal to start the tape running forward.
(5) The system control μP sets the ASSEMBLE, LOAD, MUTE and transient signals to "Lo" when the count value is about 2 frames before recording pause starts and sets the FE (Flying Erase) signal for about 5s.
 The MUTE, Transient and FE signals are synchronized with the exclusive reference signal (created from the SW30 signal) and are then supplied to each block.

2. 5 minutes after recording pause

(1) When 5 minutes have elapsed after recording pause, the pressure roller is released and the power is turned off while the tape is loaded.
(2) When the PAUSE button is pressed again, the system control μP turns the power on and waits for the cylinder rotating stably (approx. 2.4s), then presses the pressure roller against the capstan to start recording. The amount of overwriting is about 8 frames.

3. Power save mode

(1) When the Power Save signal is sent from the camera in the record pause (standby) mode, the pressure roller is released in the same way as above and the power is turned off.
(2) When the power save mode is released, the VCR enters the record pause (standby) mode.
(3) Recording pause is released after the cylinder rotates stably (2.4s).
(4) The amount of overwriting is 8 frames.

4. A. DUB

The rewinding control in assembly recording is not performed for audio signals.

6-2. Automatic editing control (with a controller)

Connect the controller and VCR as shown in Fig. 2 for automatic editing.

1. Start of editing

 Preset the controller before editing as follows.
 (a) Select the edit mode (ASBL REC, V DUB, A DUB or A/B DUB).
 (b) Set the editing points (IN/OUT points). (Note 1)
 When the AUTO EDIT button is pressed after the above settings, the tapes in both the player and recorder are fed to the preroll points. After both tapes reach the preroll points (matching the timing), the phases are matched and editing starts.

(1) Matching the timing
 The timing is matched at the preroll points before the tapes in the player and recorder are fed to the IN points. The speed of the tape feeding to the preroll points is different depending on the distance (D) between the present tape position and IN point as shown in the table below. The speed becomes lower as the tape approaches the IN point.

D OF	before 3F	before 20F	before 2s	before 4s	before 8s
Forward	1/30	1/10	1	×2	×3	×5
Reverse	-1/30	-1/10	-1	-1	-×3	-×5

F : frame

 When the tape in either player or recorder reaches the IN point earlier, it stands by for the other tape to reach the IN point in the still mode.
 (Note 1) IN point : Editing start point
  OUT point: Editing end point
 (Note 2) Preroll point : This point is located before the IN point and where the player and recorder start the editing operation. Phase matching is performed between the preroll and IN points.

(2) Phase matching
 When both tapes in the player and recorder reach the preroll points, phase matching is started before they reach the IN points. The phase matching of the recordeer is different from that in ordinary recording pause/recording (assembly period). During assembly, the phase of the vertical sync component (VD) of the video signal to be recorded and that of the playback CTL are compared directly.
 In this mode, the rotating phase of the cylinder in the recorder and the phase of VD in the source signal from the player are matched in the standard playback period in which the tape in the recorder reaches the IN point. (Note 3).
 When the playback tracking is optimized, the playback CTL phase and rotating phase of the cylinder match, and this is the same state as in assembly.
 (Note 3) When the remote select switch is set to "REMOTE 2", the servo IC enters the EXT. PRESET mode and the cylinder rotates synchronized with an external VD pulse.

2. End of editing
 Recording is performed about 2s more from the OUT point. The speed at which the tape returns from the recording end point to the OUT point is the same as in the above table.

6-3. Manual recording (with a controller)

This function lets the recorder start recording during playback when the EDIT and PLAY buttons of the controller are pressed. Neither the IN or OUT point is set. Neither is a period for phase matching provided.

6-4. Rehearsal (with a controller)

This function makes it possible to check the tape used for editing, before editing starts. When the PREVIEW button is pressed, the player plays the tape between the IN and OUT points. No signal is recorded on the tape.

6-5. Review (with a controller)

After editing is completed, this function permits the recorded section to be played back for checking. When the REVIEW button is pressed, the recorder plays the tape between the IN and OUT points.

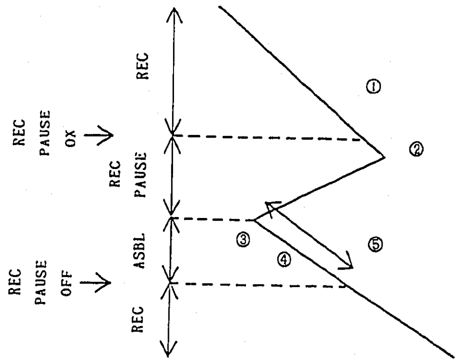


Fig. 1 Assembly Recording

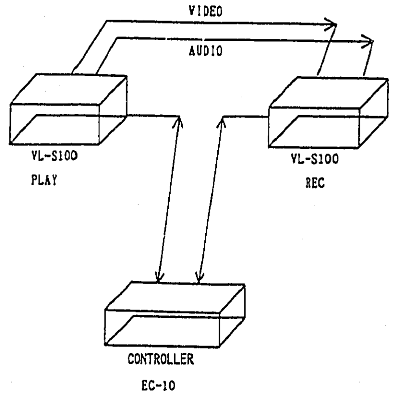


Fig. 2 Auto Editing

7. SLOW/STILL CONTROL

(1) Slow is performed by repeating still play and standard play.

(2) The procedure is as follows.
① Starts the capstan motor synchronized with the SW30 signal and starts to feed the tape.
② Detects the PB CTL signal and uses this as a reference to stop the tape.
③ The slow speed is varied by setting the period of still play.

(3) The basic operation of reverse slow is entirely the same.

(4) The signal flow is described using a block diagram.
1) Starting the tape
① The servo IC (pin 52) supplies the SW30 signal to the system control IC (pin 17).
② The system contro IC divides the SW30 signal depending on the required slow speed.
③ The system control IC supplies it to the Slow IC (pin 21)) as an acceleration signal.
④ The signal passes through the AMP in Slow IC and is output via pin 20, and is then supplied to the speed control input of the capstan driver.
⑤ The tape is started.
⑥ The servo IC adjusts the speed to half the standard speed during the period until the tape stops.

2) Stopping the tape
① The tape stop position is determined by the PB CTL signal as a reference.
② The PB CTL signal enters the Slow IC through the 30dB AMP, Servo IC and System control IC.
③ The slow tracking (pin 17) delays the tape appropriately to determine the timing at which braking is started.
④ The width of the brake pulse is determined by the MM (pin 18) to create a slow brake pulse.
⑤ This pulse is applied to the driver through an additional amp and is also output as the slow brake pulse (pin 19).
⑥ The slow brake pulse passes through IC605 (EX-OR) and enters the driver as the forward/reverse control signal.
⑦ EX-OR is used to invert the polarity of the forward/reverse signal during reverse slow.
⑧ That is, IC605 pin 8 is "Hi" during reverse slow and the signal at pin 9 inverted is output at pin 4.

(5) The amount of forward/reverse slow tracking is determined as follows.
① Assume that the amount of tape fed during forward slow until the tape is stopped after the CTL signal is detected as S2+S3 (see Fig. 2).
② It is S1+S3 during reverse slow.
(Assume that the amount of tape necessary for acceleration and deceleration is the same (S3).)
③ The tracking times during forward/reverse slow are T2 and T1.
④ The amount of tape fed at a time is fiexed, therefore,
S1+S2 = (fixed) ... T1+T2 = (fixed).
⑤ The components connected to the slow tracking MM externally are configured to satisfy this relationship.

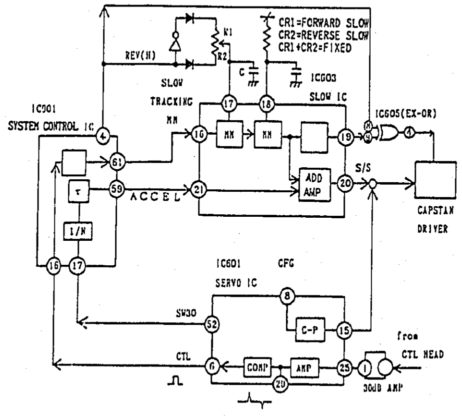

CR1=FORWARD SLOW
CR2=REVERSE SLOW
CR1+CR2=FIXED
REV(H)
R1
R2
C
IC603
SLOW IC
SLOW TRACKING MM
IC601
SYSTEM CONTROL IC
4
61
59
16
17
MM
MM
ADD AMP
19
20
21
ACCEL
τ
1/N
IC605(EX-OR)
S/S
CAPSTAN DRIVER
IC601
SERVO IC
CFG
8
C-P
15
SW30
52
CTL
6
COMP
AMP
20
25
from CTL HEAD
30dB AMP

Fig. 1 Slow Block Diagram

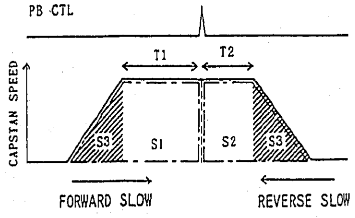

PB CTL
T1
T2
CAPSTAN SPEED
S3
S1
S2
S3
FORWARD SLOW
REVERSE SLOW

Fig. 2 Slow Tracking

8. MECHANISM

8-1. General Description

Though this mechanism is a chassis for use in a table-top VCR which can record and play back an ordinary VHS cassette, it is different from the previous mechanism and has the following features.

(1) Using the reel motor: To handle the editing function.

(2) Using the motive power of the reel motor for the front loading.
- In previous VCRs, the motive power of the capstan motor was used by the front loading mechanism, but in this model, the motive power of the reel motor is used.

(3) Half loading
- During fast forward and rewind, the tape is half-loaded and the search signal recorded on the control track is picked up by the control head, thus enabling the memory search function.

(4) DD capstan motor
- Providing the DD capstan motor which was previously only used in portable VCRs allows the chassis to handle various functions such as high-speed search, etc.

(5) Using an aluminum die-cast chassis

(6) The cylinder has amorphous heads with built-in preamplifiers.

8-2. Major components locations (top view) and operations (Fig. 1)

(1) Supply reel disk
This has a ferrite ring at the back to detect rotation and a gear on its periphery to transmit motive power. A slip mechanism is not provided inside.

(2) Tension band
This operates using the same principle as in previous mechanisms. To change the tape tension, the hooking position of the spring which pulls the tension arm must be changed.
To change the angle of the tape wound round the tension pole, turn the eccentric shaft section of the tension band.

(3) Guide pole
This controls the height of the tape after the tension pole. Use a box driver and turn it to adjust the height of the guide pole. The compression spring which was used conventionally has been omitted.

(4) FE head
This works in the same way as in the conventional mechanism. The installation method has been changed from the screw type to the insert and fix type.

(5) Impedance roller
This reduces jitter as in the conventional mechanism. Since this is a precision-made roller, take care not to scratch or lubricate it.
If the roller is lubricated, the following troubles may occur.
1) Oil could leak and adhere to the tape.
2) Rotation could suffer due to the viscosity of the oil.

(6) Guide rollers
These have the same construction as conventional guide rollers and the roller section is molded from resin. Adjust the height by loosening the lock screw at the bottom of the roller using a hexagonal wrench (Allen key) and then by inserting a flat bladed screwdriver into the groove in the top of the roller.

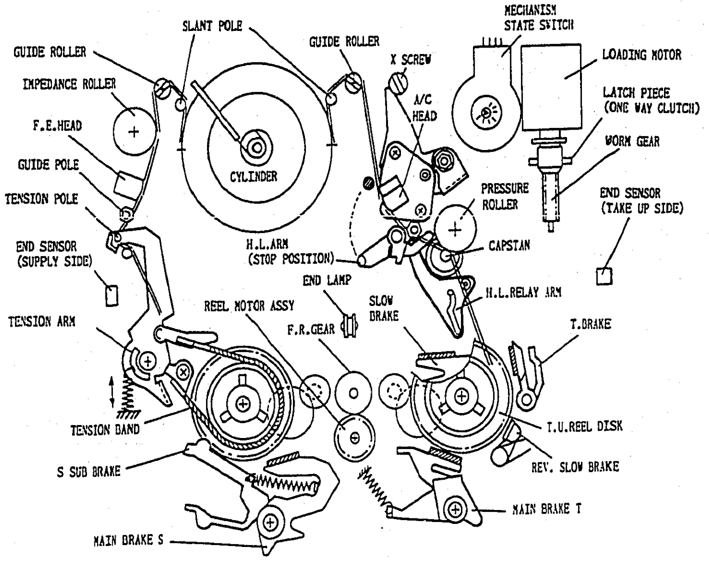


Fig. 1 Main F-chassis (Top View)

(7) Cylinder assembly
Replace the cylinder as a whole assembly because it is made with ultra-high precision.

(8) X-value adjustment screw (X-SCREW)
Though this screw is positioned between the A/C head and capstan shaft in previous VCRs, it is provided beside the take-up arm stopper (V BLOCK) in this model. When the X-screw is brought near the capstan shaft, allowing the X-value to be increased.

(9) A/C head
Actually this head comprises (1) the audio erase head, (2) audio head and (3) control head.
The audio erase head erases the previously recorded audio signal in the audio dub mode.
The audio head records and plays back an audio signal (linear audio head).
The control head records and plays back a 30Hz signal obtained by separating the sync signal from the video signal and dividing it by two, thus controlling the tape speed during playback.

(10) H.L. (Half Loading) arm
This arm is used to access the "index search and address search system" that is a new feature of VHS VCRs. During fast forward and rewind, this arm pulls the tape out of the cassette to set it to the half loading state so it is in contact with the A/C head.
The A/C head reads the control signals with the duty of 60±5% (equivalent to a "0" digital signal) and 25±27.5% (equivalent to "1") recorded on the control track, thus allowing index search and address search.
Though the H.L. arm is set to the same position during fast forward/rewind and play, the pin on the arm is not in contact with the tape during play.

(11) Capstan
Using a DD capstan motor allows various functions such as high-speed search, etc. The CFG pulse frequency is 2160Hz in the SP mode.
During slow motion, the slow brake is pressed against the capstan to brake the capstan flywheel, thus simplifying control. Oil-less metal is used for the upper bearing and a ball bearing for the lower bearing.

(12) Pressure roller
Since one ball bearing is used at the center, adjusting the perpendicularity of the pressure roller is not necessary. Its structure is the same as the conventional roller.

(13) Take-up reel disk
This has a ferrite ring at the bottom to detect rotation and gear on its periphery at the bottom to transmit motive power. A slip mechanism is not provided inside. The T brake, pressed against the external circumference, not only prevents the tape from being pulled out from the take-up reel disk during loading but also applies reverse torque to the disk during reverse search to prevent tape slack.

(14) T brake
This is pressed against the take-up reel disk to apply weak braking to the disk. During loading, this brake is pressed against the take-up reel disk to brake the disk so that the tape is not pulled out from the disk.
During reverse search, the T brake is also pressed against the take-up reel disk to prevent tape slack.

(15) Reel motor and FR gear
The reels are driven by an exclusive reel motor. A motor gear is provided on the shaft of the reel motor with which the FR gear is engaged. The FR gear swings to the left or right according to the direction to rotation of the motor gear to drive both reel disks.

(16) Slow brake
During slow motion, this is pressed against the DD capstan flywheel so it is easier for the capstan to stop instantaneously.
This slow brake is provided to turn the capstan motor on and off and time the tape transport and head, thus providing a clear slow motion picture.

(17) S sub-brake
This is pressed against the supply reel disk above the tension band and applies weak torque to the disk during loading and fast forward to prevent slack tape.

(18) Main brakes S and T
These are pressed against both reel disks to brake them. It is important to drive the brakes with the same timing and maintain the friction at the brake contact surfaces at more than the specified value.

8-3. Major components locations (side view) and operations (Fig. 2)

	Mode	F.L change gear position	Remarks
1	Front loading	Lo	
2	PLAY/REC FF/REW LOADING UNLOADING	Hi	

Position of F.L change gear
*The F.L change gear is set to the "Hi" or "Lo" position by slider M.

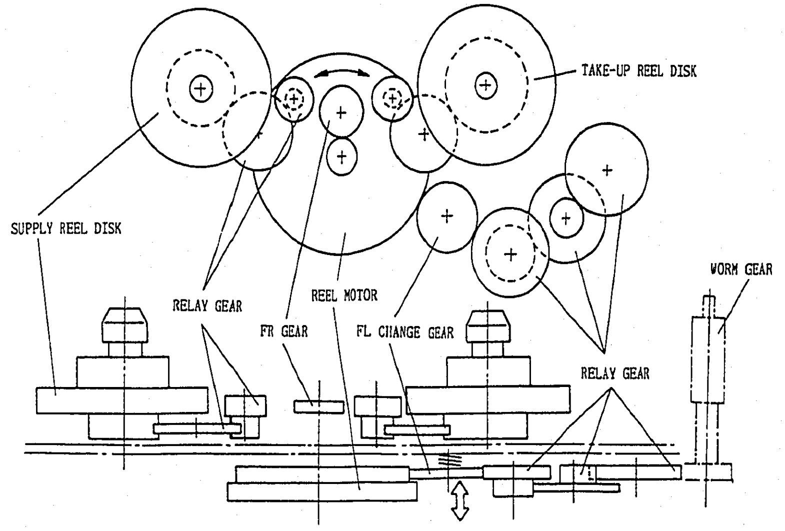

TAKE-UP REEL DISK
SUPPLY REEL DISK
WORM GEAR
RELAY GEAR
REEL MOTOR
FR GEAR
FL CHANGE GEAR
RELAY GEAR

Fig. 2 Main F-chassis (Side View)

8-4. Loading mechanism (Fig. 3)

The torque of the loading motor is reduced by the worm gear and worm wheel and is transmitted to the mode gear.

A groove for loading is provided on the back of the mode gear and the pin caulked to the pull-up arm is linked with the groove. The rack is linked with the pull-up arm so that it turns freely and load gear R is engaged with the teeth at the end of the rack. The load gear L is engaged with load gear R. When the loading motor rotates, the rack is pulled in the up direction as shown in Fig. 3 and load gear R turns counterclockwise and load gear L turns clockwise. The load link R is linked with load gear R so it turns freely and load link L is linked with load gear L so it turns freely in the same way. The take-up and supply guide roller assemblies are linked with the ends of both load links. When the load gears turn in the loading direction, the tape is pulled out of the cassette as loading proceeds and the links advance along the guide grooves in the chassis causing the tape to wind around the cylinder. When loading is completed, the mechanism state switch beside the loading motor detects the sixth position, "REC/PLAY", and stops the rotation of the loading motor.

Unloading is the reverse to loading, so an explanation is omitted.

Since the markings are present to the rack and load gear R for phase matching, and on load gears R and L, assemble them while aligning the markings. The mode gear also has a hole for phase matching with the chassis. Align them for assembly.

Assemble the mechanism state switch so the mode gear for driving the mechanism state switch and the mechanism state switch with the start point adjusted are engaged with each other.

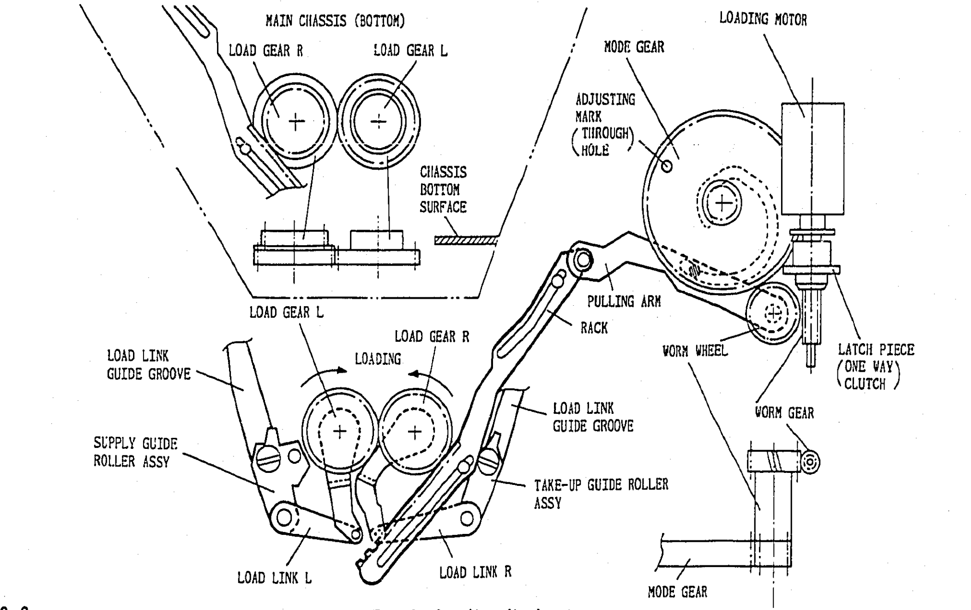

MAIN CHASSIS (BOTTOM)
LOAD GEAR R
LOAD GEAR L
CHASSIS BOTTOM SURFACE
LOADING MOTOR
MODE GEAR
ADJUSTING MARK (THROUGH HOLE)
LOAD GEAR L
LOAD GEAR R
LOADING
PULLING ARM
RACK
WORM WHEEL
LATCH PIECE (ONE WAY CLUTCH)
LOAD LINK GUIDE GROOVE
LOAD LINK GUIDE GROOVE
WORM GEAR
SUPPLY GUIDE ROLLER ASSY
TAKE-UP GUIDE ROLLER ASSY
LOAD LINK L
LOAD LINK R
MODE GEAR

Fig 3. Loading Mechanism

8-5. Main brake drive mechanism (Fig. 4)

Fig. 4 shows the main brake drive mechanism. A cam groove for driving the main brake is provided on the mode gear with which the pin of the brake pulling arm is linked. A pin is provided at the right end of the brake pulling arm and is linked with the groove in the brake connecting arm. When the loading motor turns in the loading direction, the brake connecting arm is pulled in the up direction in Fig. 4. The brake change arm linked with the brake connecting arm turns counterclockwise to pull slider B to the right. Since main brake S is contact with slider B via the relay arm and main brake T is in contact with slider B, when slider B moves to the right, main brakes T and S are released from the take-up and supply reel disks to make both disks rotate freely.

When the stop button is pressed in the play mode, the loading motor turns in the unloading direction and the take-up and supply guide roller assemblies start to return along the grooves in the chassis. At the same time, the capstan motor turns counterclockwise and presses the FR gear against the supply reel disk to wind the tape around the supply reel disk.

When the tape is housed completely in the cassette, projection P on the brake connecting arm is pushed to the right by the projection on the latch piece. This releases the link between the brake connecting arm and the pin on the brake pulling arm and the brake pulling arm is pulled by the spring force quickly downwards in the figure. When the brake connecting arm moves rapidly downwards, the brake change arm turns clockwise pushing slider B to the left. This turns main brake S linked with slider B clockwise and brakes the supply reel disk. At the same time, main brake T turns clockwise and brakes the take-up reel disk. The latch piece attached to the loading motor is a unidirectional clutch. When it turns clockwise and the projection is in contact with section P on the brake connecting arm, it slips. When it turns counterclockwise, it does not slip, but pushes section P forcibly to the right. This releases the link between the pin on the brake pulling arm and brake connecting arm and the brake connecting arm is returned downwards by the spring force. The operation of this latch piece section is the same as that in conventional mechanisms.

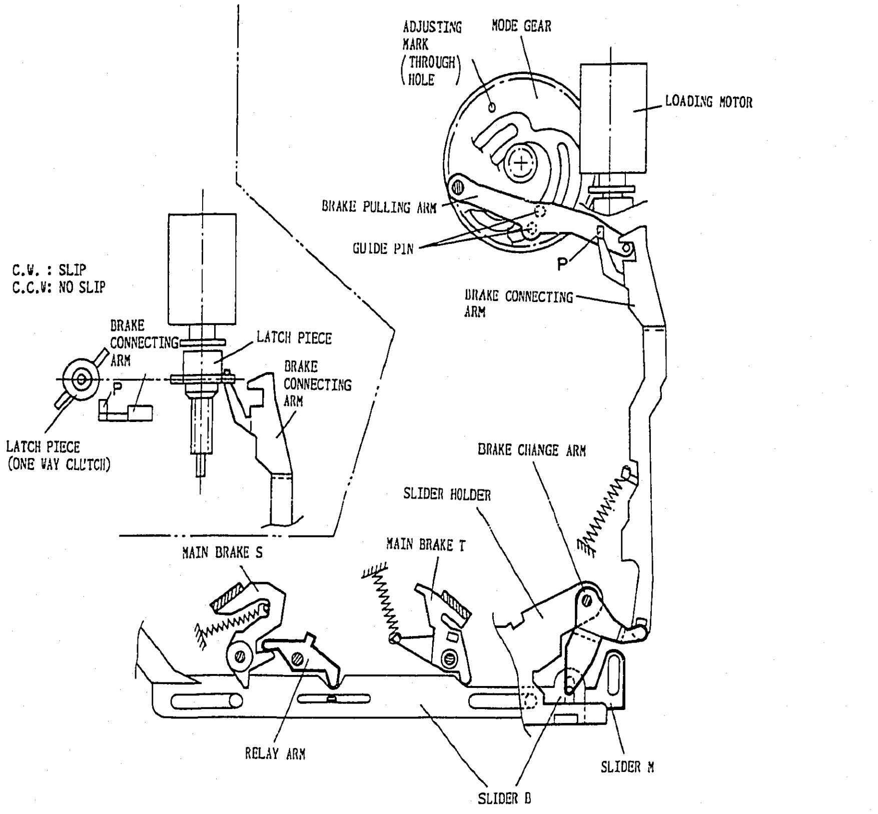

ADJUSTING MARK (THROUGH HOLE)
MODE GEAR
LOADING MOTOR
BRAKE PULLING ARM
GUIDE PIN
P
BRAKE CONNECTING ARM
C.W. : SLIP
C.C.W: NO SLIP
BRAKE CONNECTING ARM
LATCH PIECE
P
BRAKE CONNECTING ARM
LATCH PIECE (ONE WAY CLUTCH)
BRAKE CHANGE ARM
SLIDER HOLDER
MAIN BRAKE T
MAIN BRAKE S
RELAY ARM
SLIDER M
SLIDER B

Fig. 4 Main Brake Drive Mechanism

8-6. Pressure roller and subbrake drive mechanism (Fig. 5)

Fig. 5 shows the pressure roller and subbrake drive mechanism. A groove for driving the pressure roller operation arm is provided on the top surface of the mode gear and the pin on the pressure roller operation arm is linked with the groove.

When the mode gear turns clockwise, the pressure roller operation arm turns counterclockwise. Since the hook protruding from the side of the pressure roller operation arm pulls the pressure roller spring up, the pressure roller change arm fastened to the load block bracket by a pin so that it can turn freely, turns counterclockwise. As this operation progresses, the pressure roller link fastened to the pressure roller change arm so that it can turn freely is pulled to the right. A hole is provided on the left end of the pressure roller link and the pin on the pressure roller arm is linked with it. When the pressure roller link moves to the right, the pressure roller arm turns counterclockwise to press the pressure roller against the capstan shaft. Since the mode gear turns in the loading direction after the pressure roller is pressed against the capstan shaft, the pressure roller operation arm turns counterclockwise to pull up the pressure roller spring. However, as the movement of the pressure roller change arm is blocked because the pressure roller is pressed against the capstan shaft, the pressure roller spring is pulled up to generate pressure between pressure roller and capstan.

As the pressure roller operation arm turns, the mode change arm linked with it also turns clockwise or counterclockwise to move slider M linked with the pin on the end of the mode change arm to the left or right. This moves the S subbrake linked with slider M and performs the "on" or "off" operation of the supply reel disk to apply a weak brake to the disk or release it.

8-7. T brake and slow brake drive mechanism (Fig. 6)

Fig. 6 shows the drive mechanism of the T brake and slow brake.

The T brake operation arm linked with the groove in the bottom surface on the mode gear has a U-shape groove in its bottom end with which the pin on the T brake is linked. As the mode gear turns, the T brake operation arm moves to the left and right to press or release the T brake against/from the take-up reel disk. This T brake applies a strong brake to the take-up reel disk during loading and unloading to prevent slack tape. The S subbrake is pressed against the supply reel disk. The T brake also applies a weak brake to the take-up reel disk to prevent slack tape during reverse search.

The edge of the T brake is in contact with the slow brake. As the T brake operates, the slow brake is pressed against the capstan flywheel to reduce its inertia, thus making the capstan flywheel rotate and stop quickly during slow motion.

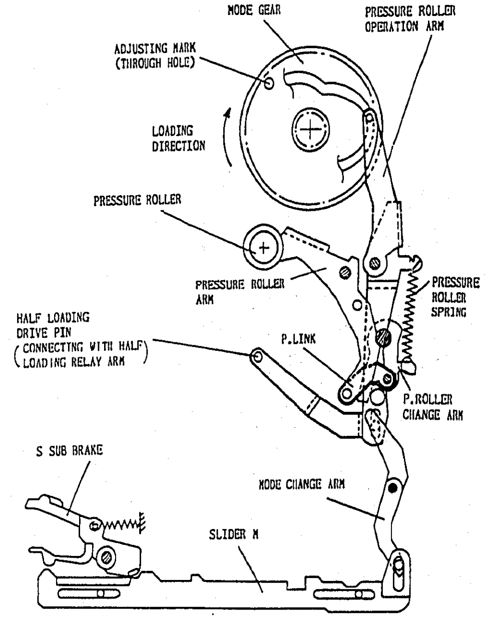

MODE GEAR
PRESSURE ROLLER OPERATION ARM
ADJUSTING MARK (THROUGH HOLE)
LOADING DIRECTION
PRESSURE ROLLER
PRESSURE ROLLER ARM
PRESSURE ROLLER SPRING
HALF LOADING DRIVE PIN (CONNECTING WITH HALF LOADING RELAY ARM)
P.LINK
P.ROLLER CHANGE ARM
S SUB BRAKE
MODE CHANGE ARM
SLIDER M

Fig. 5 Pressure Roller and Subbrake Drive Mechanism

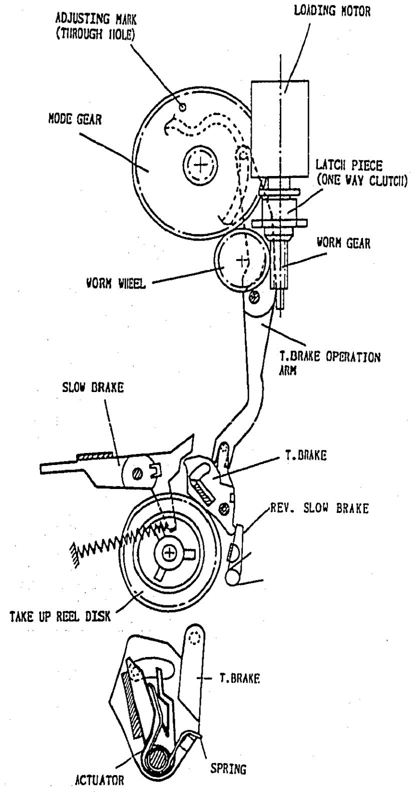

ADJUSTING MARK (THROUGH HOLE)
LOADING MOTOR
MODE GEAR
LATCH PIECE (ONE WAY CLUTCH)
WORM GEAR
WORM WHEEL
T.BRAKE OPERATION ARM
SLOW BRAKE
T.BRAKE
REV. SLOW BRAKE
TAKE UP REEL DISK
T.BRAKE
ACTUATOR
SPRING

Fig. 6 T Brake and Slow Brake Drive Mechanism

8-8. F-mechanism operation table (Fig. 7)

Fig. 7 shows the F-mechanism operation table.

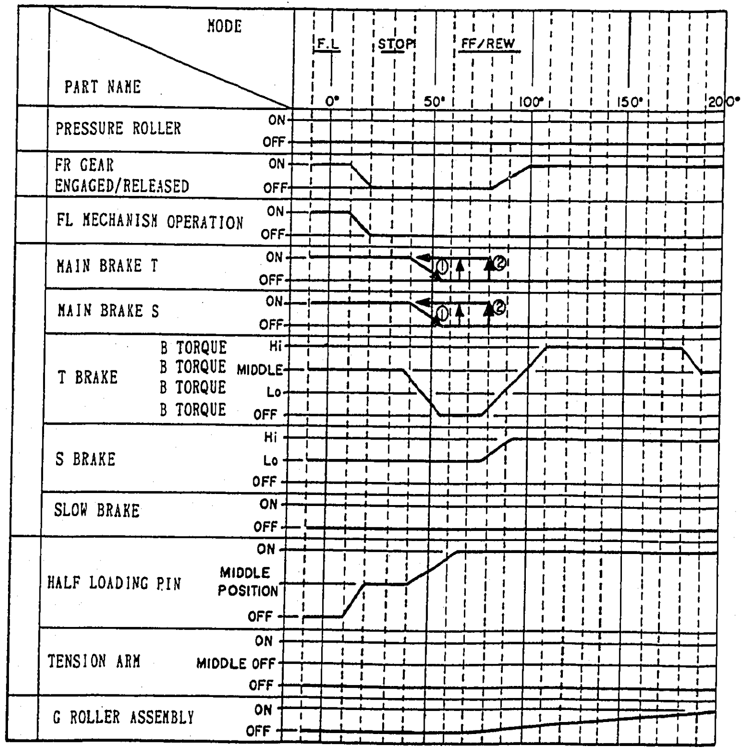


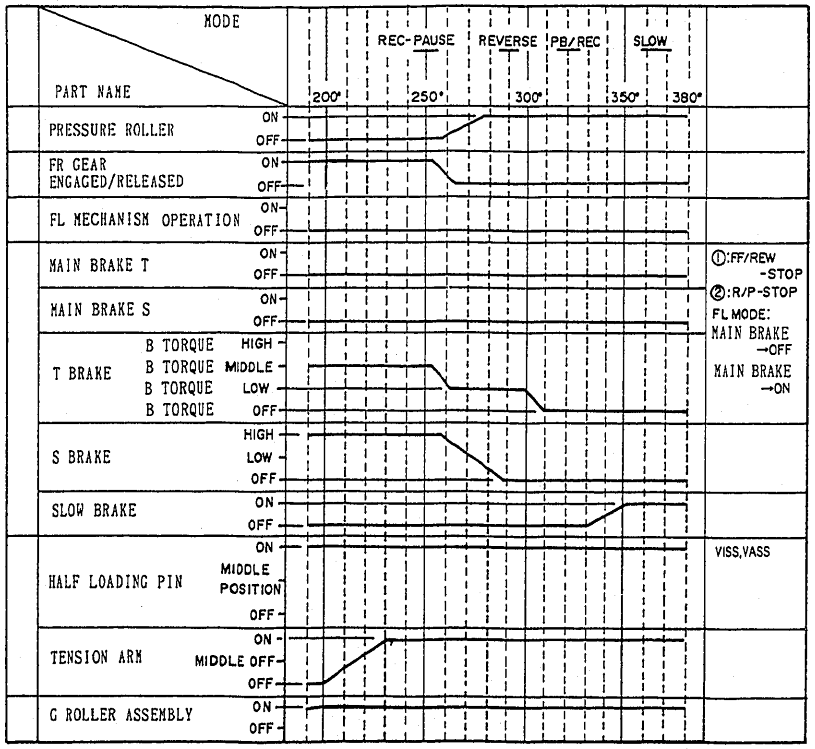
Fig. 7 F-mechanism Timing Chart

8-9. Front loading mechansim (Fig. 8)

Fig. 8 shows the front loading mechanism.

In this mechanism, a motor exclusively for front loading is not used and the motive power of the reel motor is used for the front loading operation. When a cassette is inserted into the cassette holder and pushed in by approx. 11-14mm, the microswitch is pressed by switch lever A and the reel motor turns "on" to perform the loading operation. When loading is completed, the right end of switch lever B is pushed down, switch lever A goes up and the microswitch goes from "Lo" to "Hi", thus braking stops.

When eject is commanded, the reel motor rewinds the tape for a short period to remove slack before eject. Then, the motive power of the reel motor is released from the supply reel disk and the reel motor runs in reverse and the cassette is ejected. An accumulator is provided in the worm wheel assembly. When a cassette is inserted, the inner gear is turned, but the outer gear is stopped by the accumulator. When the microswitch is pressed and goes from "Lo" to "Hi", the reel motor starts to turn in the loading direction and performs the loading operation.



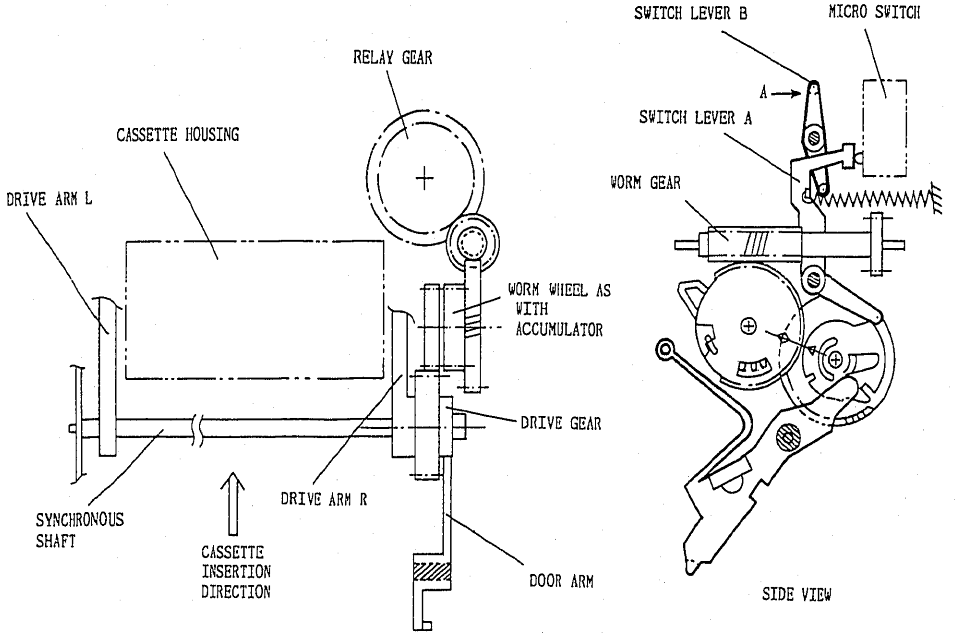

RELAY GEAR
CASSETTE HOUSING
DRIVE ARM L
WORM WHEEL AS WITH ACCUMULATOR
DRIVE GEAR
SYNCHRONOUS SHAFT
CASSETTE INSERTION DIRECTION
DRIVE ARM R
DOOR ARM
SWITCH LEVER B
MICRO SWITCH
A
SWITCH LEVER A
WORM GEAR
SIDE VIEW

Fig. 8 Front Loading Mechanism

HITACHI

HITACHI SALES CORPORATION OF AMERICA
Eastern Regional Office
1290 Wall Stree West, Lydhurst, New Jersey 07071, U.S.A.
Tel. 201-935-8980

Mid-Western Regional Office
1400 Morse Ave., Elk Grove Village, Illinois 60007, U.S.A.
Tel. 312-593-1550

Southern Regional Office
510 Plaza Drive, College Park, Georgia 30349, U.S.A.
Tel. 404-763-0360

Headquarters, Western Regional Office
401 West Artesia Blvd.,Compton, California 90220 U.S.A.
Tel. 213-537-8383

HITACHI SALES CORPORATION OF HAWAII. INC.
3219 Koapaka Street. Honolulu, Hawaii 96819, U.S.A.
Tel. 808-836-3621

HITACHI (HSC) CANADA INC.
3300 Trans-Canada Highway, Pointe Claire, Quebec,
H9R 1B1, Canada
Tel. 514-697-9150

HITACHI SALES CENTROAMERICANA, S.A.
San Rafael de Escazu, (Apartado 10272-1000), San Jose,
Costa Rica
Tel. 28-20-11, 28-00-37

HITACHI SALES CORPORATION DE PANAMA, S.A.
Balboa Avenue (end), in front of Mothers' Commemorative
Park, San Francisco, Apartado Postal 7657, Panamá 5,
Panamá City, Republic of Panamá
Tel. 63-6500, 63-6491

HITACHI SALES CORPORATION. TOKYO JAPAN
Head Office: THE HITACHI ATAGO BLDG.
No. 15-12, 2-Chome Nishi-Shinbashi
Minato-Ku, Tokyo 105, Japan
Tel. Tokyo (03) 502-2111

VL-S100(U)

VL-S100(U)

VL-S100(U) TK No.3261E TOKAI

Copyright © Hitachi, Ltd. 1990. All rights reserved. Printed in Japan (I)

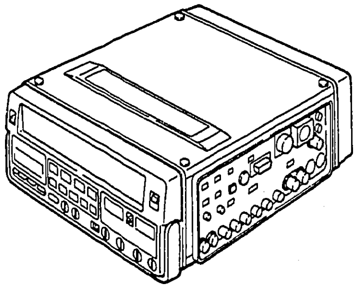
HITACHI

SERVICE MANUAL

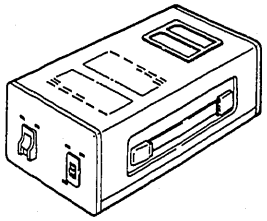
TK No. 3227E

VL-S100(U)
VL-AC10(U)
VL-EC10(U)/EC20(U)

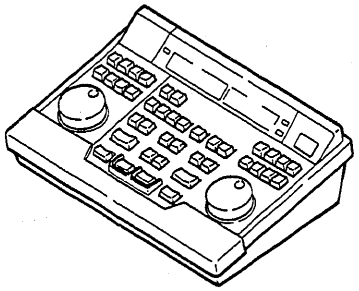
Technical Data



–VL-S100(U)–



–VL-AC10(U)–



–VL-EC10(U)–
(VL-EC20(U))

S VHS **VHS**
This video deck is a S-VHS type video recorder. For proper operation, only the S-VHS or VHS type cassette must be used.

MANUALS RELATED TO THE VL-S100(U)

Name of Manual	Language	Manual No.	Chapters included
Technical Data	English	3227E	Chapters 1-8
Technical Information	English	3261E	–

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

S-VHS PROFESSIONAL VCR
AC ADAPTOR/CHARGER
EDITING CONTROL UNIT

February 1990 TOKAI WORKS

SPECIFICATIONS VL-S100

Recording	Rotating 2-head helical scan S-VHS/VHS format (for NTSC system)
Record and playback time	SP mode 2 hours, 40 minutes. (using T-160 videocassette) in VHS format 2 hours (using an ST-120 videocassette) in S-VHS format
Tape speed	33.4mm/s in SP mode
Tape width	12.7mm
Videocassettes used	VHS or S-VHS videocassettes
Video input	S-VIDEO: 1.0Vp-p, 75Ω unbalanced luma signal/0.286Vp-p, 75Ω unbalanced chroma signal VIDEO: 1.0Vp-p, 75Ω unbalanced CAMERA: Y/C: 1.0Vp-p, 75Ω unbalanced luma signal/0.286Vp-p chroma signal VBS: 1.0Vp-p, 75Ω unbalanced
Video output	S-VIDEO: 1.0Vp-p, 75Ω unbalanced luma signal/0.286Vp-p, 75Ω unbalanced chroma signal VIDEO: 1.0Vp-p, 75Ω unbalanced CAMERA: 1.0Vp-p, 75Ω unbalanced SOURCE: 1.0Vp-p, 75Ω unbalanced
Horizontal resolution	Color: At least 400 lines in S-VHS At least 240 lines in VHS
Video S/N	46dB or higher in S-VHS and VHS
Audio input	Line: −8dBs 47kΩ unbalanced (0dBs = 0.775 Vrms) Microphone: −70dBs 1.6kΩ balanced Camera: −20dBs 8kΩ balanced
Audio output	Line: −8dBs 1.5kΩ unbalanced Headphones: −50 to −20dBs variable 8Ω − 2kΩ
Audio tracks	4 tracks (2 Hi-Fi VHS audio tracks: stereo recording/stereo playback, 2 normal audio tracks: stereo recording/stereo playback)
Hi-Fi VHS audio characteristics	Dynamic range: 80dB or greater Frequency: 20Hz to 20kHz Wow and flutter: 0.005%
Normal audio characteristics	Audio S/N: 48dB or greater (with Dolby NR on) Frequency: 50Hz − 12kHz
Time code	Input: 1.0Vp-p, 56kΩ Output: 0.2Vp-p, 5.6kΩ
Fast forward and rewind time	About 5 minutes (with ST-120 videocassettes)
Permissible operating temperature range	32°F − 104°F
Permissible relative humidity	35% − 80%
Power input	DC 12V
Power consumption	18 watts during recording
Outside dimensions	10-3/8"(W) x 4-5/16"(H) x 12-3/16"(D) 26.4 (W) x 11.0 (H) x 30.9 (D) cm
Weight	9.9 lbs (4.5kg) (approx.)
Accessories provided	Carrying case, battery conversion connector, shoulder strap, S video cable

SPECIFICATIONS VL-EC10/VL-EC20

Auto edit:	PREVIEW, EDIT, REVIEW, GOTO and END
Manual control:	STOP, PLAY, PAUSE/STILL, REW, FF, STD-BY, EJECT, REC (recorder only) and EDIT (recorder only)
Time counter:	CTL 00:00:00:00 to 23:59:59:29 (24 hours) or −4:00:00:00 to 19:59:59:29 (24 hours)
Edit precision:	CTL ±2 frames (±5 frames: Used with VL-S100)
Preroll time:	3, 5, and 7 seconds selectable
Correction of edit point:	±1 frame shift
Display contents:	Counter, total time, IN and OUT
Display:	Two 8-digit LEDs
Accessories:	9-pin remote cables for the VL-EC10 (×2) 9-pin remote cables for the VL-EC20 (×3) AC power cable (×1)
Power:	120V AC ±10%, 60 Hz
Power consumption:	7 watts for the VL-EC10, 8 watts for the VL-EC20
Operating temperatures:	0°C ~ 40°C (32°F ~ 104°F)
Storage temperatures:	−20°C ~ 60°C (−4°F ~ 140°F)
Humidity:	80% or less
Dimensions:	392mm (W) x 89mm (H) x 268mm (D)
Weight:	3kg (approximate)

SPECIFICATIONS VL-AC10

Power Input:	AC 120V, 60 Hz
Power Consumption:	110 VA
Rating Output:	DC 13V, 4A maximum
Charge Time:	About 70 − 90 minutes/one battery
Charge System:	Constant current, negative delta V detection, timer control
Weight:	2.4 kg
Dimensions:	160 (W) × 102 (H) × 309 (D) mm 6-5/16" (W) × 4" (H) × 12-3/16" (D)
Accessories:	DC cable × 1 AC cable × 1

- For the purpose of improvements, Hitachi reserves the right to make changes in specifications and external appearance of this model at any time without prior notice.

CONTENTS

CHAPTER 1 GENERAL DESCRIPTION

VL-S100

1. Optional Accessories · · · · · · · · · · · 1−1
2. Inputs · · · · · · · · · · · · · · · · · · 1−1
3. Outputs · · · · · · · · · · · · · · · · · 1−1
4. Functions and Operations · · · · · · · · · 1−1
5. Major Technologies · · · · · · · · · · · · 1−2
6. Operation Switches, Indicators and Controls on Front Panel · · · · · · · · · · · · · 1−5
7. Operation Switches and Jacks on Side Panel · · · · · · · · · · · · · · 1−7
8. Operation Switches on Bottom Panel · · · 1−9
9. Various Editing Operations · · · · · · · · 1−10

VL-AC10

10. Features and Electrical Specifications
10-1 Features · · · · · · · · · · · · · · · · 1−12
10-2 Control System · · · · · · · · · · · · · 1−12
10-3 Electrical Specifications · · · · · · · 1−12
10-4 Detection Switches and Indicators · · 1−13
10-5 Output Protection Functions · · · · · · 1−13

VL-EC10/EC20

11. Features · · · · · · · · · · · · · · · · 1−14
12. Electrical Specifications · · · · · · · · 1−14
13. Names and Functions of Switches · · · · 1−14
14. Connection Jacks (On Rear Panel) · · · · 1−16
15. Editing · · · · · · · · · · · · · · · · · 1−17
16. Editing Chart · · · · · · · · · · · · · · 1−18

CHAPTER 2 DISASSEMBLY

1. LOCATIONS OF CIRCUIT BOARDS · · · · · · · 2−1

2. CASE REMOVAL

2-1 Handle · · · · · · · · · · · · · · · · · 2−2
2-2 Top Cover · · · · · · · · · · · · · · · · 2−2
2-3 Side Cover · · · · · · · · · · · · · · · 2−2
2-4 Bottom Cover · · · · · · · · · · · · · · 2−2
2-5 Front Panel · · · · · · · · · · · · · · · 2−3
2-6 Rear Cover · · · · · · · · · · · · · · · 2−3

3. CIRCUIT BOARD REMOVAL

3-1 VID, ENC and DIG Circuit Boards · · · · 2−4
3-2 IPP Circuit Board · · · · · · · · · · · · 2−4
3-3 PBK Circuit Board · · · · · · · · · · · · 2−4
3-4 DMD Circuit Board · · · · · · · · · · · · 2−4
3-5 REM Circuit Board · · · · · · · · · · · · 2−5
3-6 FSW Circuit Board · · · · · · · · · · · · 2−5
3-7 LCD Circuit Board · · · · · · · · · · · · 2−5
3-8 REG Circuit Board · · · · · · · · · · · · 2−5
3-9 Battery Terminal · · · · · · · · · · · · 2−6
3-10 SBD Circuit Board · · · · · · · · · · · 2−6
3-11 MAS Circuit Board · · · · · · · · · · · 2−6
3-12 Jack Plate · · · · · · · · · · · · · · · 2−6
3-13 SWA Circuit Board · · · · · · · · · · · 2−6
3-14 SWB Circuit Board · · · · · · · · · · · 2−6
3-15 SC Circuit Board · · · · · · · · · · · · 2−6
4. NAMES AND LOCATIONS OF MAIN MECHANICAL COMPONENTS · · · · · · · · · · 2−7

5. CASSETTE LOADING MECHANISM REMOVAL

5-1 Cassette Loading Mechanism · · · · · · 2−9
5-2 Loading Gear Assembly, Chassis Holder, Cassette Holder Assembly and Chassis Holder · · · · · · · · · · · · 2−9
5-3 Cassette Holder Base and Cassette Holders (L/R) · · · · · · · · · · · · · 2−10
5-4 Loading Gear · · · · · · · · · · · · · · 2−10

6. MAIN MECHANICAL COMPONENTS REMOVAL

6-1 Heads · · · · · · · · · · · · · · · · · · 2−11
6-2 Cylinder Motor Assembly · · · · · · · · 2−12
6-3 Capstan Motor Assembly · · · · · · · · 2−12
6-4 Reel Motor Assembly · · · · · · · · · · 2−13
6-5 Loading Motor/Mechanism State Switch Assembly and Dew Sensor · · · · · · · · 2−13
6-6 Tension Arm/Tension Band Assembly · · · 2−14
6-7 Slider Block · · · · · · · · · · · · · · 2−14
6-8 Supply/Take-up Reel Disks, S-VHS Detection Switch, Half Loading Arm and Relay Arm · · · · · · · · · · · · · 2−15
6-9 Rollers and Guides · · · · · · · · · · · 2−16
6-10 Loading Motor Block, Brake Link Arm and FS Brake Arm · · · · · · · · · · · 2−17
6-11 Load Bracket Assembly and Take-up Brake Assembly · · · · · · · · · · · · 2−17
6-12 Brake Operation Arm, Mode Gear, Worm Wheel, Pressure Roller Operation Arm, Mode Change Arm and Bracket Lift Arm · 2−18
6-13 Cylinder Motor Base and Supply/Takee-up Loading Arms · · · · · · · · · · · · · 2−19

6-14 Gear Base Assembly · · · · · · · · · · · 2-20
6-15 Change Arm, Change Gear and Relay
Gears 1, 2 and 3 · · · · · · · · · · · · 2-20

CHAPTER 3 ELECTRICAL ADJUSTMENT

MEASUREMENT EQUIPMENT · · · · · · · · · · · · 3-1
1. SERVO CIRCUIT ADJUSTMENT
  1. fsc PLL Frequency Adjustment · · · · · 3-2
  2. PB Switching Point · · · · · · · · · · 3-2
  3. CTL Delay Adjustment · · · · · · · · · 3-2
  4. Play Pretracking · · · · · · · · · · · 3-3
  5. PLL Lock Phase Adjustment · · · · · · 3-3
  6. PB SW30 Switching Point · · · · · · · 3-3
  7. Slow Brake Pulse Width · · · · · · · · 3-4
  8. Vert. Drive Pulse Adjustment · · · · · 3-4
2. ANALOG PROCESS CIRCUIT ADJUSTMENT
  1. EE Y Level · · · · · · · · · · · · · · · 3-5
  2. EE C Level · · · · · · · · · · · · · · · 3-5
  3. Subemphasis Limiter Balance · · · · · 3-5
  4. HB Deviation · · · · · · · · · · · · · 3-5
  5. Y/C Separtion · · · · · · · · · · · · 3-5
  6. COMB-C Level · · · · · · · · · · · · · 3-5
  7. Preparation (VHS mode) · · · · · · · · 3-6
  8. LB Record Current (VHS mode) · · · · · 3-6
  9. HB Record Current (S-VHS mode) · · · · 3-6
  10. C Record Current (S-VHS mode) · · · · 3-6
  11. Mode discrimination Threshold Level · 3-7
  12. Subemphasis Limiter Balance · · · · · 3-7
  13. DOC · · · · · · · · · · · · · · · · · · 3-7
  14. PB Through Y Level (HB) · · · · · · · 3-7
  15. PB Through C Level · · · · · · · · · · 3-7
  16. PB Throuhg Y Level (LB) · · · · · · · 3-7
3. DIGITAL PROCESS CIRCUIT ADJUSTMENT
  1. PB VCO Lock Voltage · · · · · · · · · 3-8
  2. PH H Phase · · · · · · · · · · · · · · 3-8
  3. Initial Reset Phase · · · · · · · · · 3-8
  4. Reference VCO Lock Voltage · · · · · · 3-8
  5. Reference H Phase · · · · · · · · · · 3-8
  6. DIG PB Sync Level · · · · · · · · · · 3-8
  7. DIG PB Y Level · · · · · · · · · · · · 3-8
  8. Encoder Input Level · · · · · · · · · 3-9
  9. Burst Level Coarse Adjustment · · · · 3-9
  10. White Balance · · · · · · · · · · · · 3-9
  11. Encoder Output Level · · · · · · · · · 3-9
  12. Tint · · · · · · · · · · · · · · · · · 3-9
  13. Burst Level · · · · · · · · · · · · · 3-9
  14. Tint · · · · · · · · · · · · · · · · · 3-9
  15. Tint Precise Adjustment · · · · · · · 3-9
  16. P in P Tint · · · · · · · · · · · · · 3-10
4. AUDIO CIRCUIT BOARD ADJUSTMENT
  4-1 Linear Audio Block Adjustment · · · · · 3-11
    1. PB Level Adjustment · · · · · · · · · 3-11
    2. REC Bias Level Adjustment (S-VHS) · · 3-11
    3. REC Bias Level Adjustment (VHS) · · · 3-11
    4. REC Level Adjustment · · · · · · · · · 3-11
  4-2 Hi-Fi Audio Block Adjustment · · · · · 3-12
    5. PB Level Adjustment · · · · · · · · · 3-12
    6. DO (Drop Out) Adjustment · · · · · · · 3-12
    7. REC Level · · · · · · · · · · · · · · 3-12
    8. Deviation Adjustment · · · · · · · · · 3-12
    9. Level Meter Adjustment · · · · · · · · 3-12
5. POWER SUPPLY CIRCUIT (FSW, REG and MAS CIRCUIT BOARDS) AND IPP CIRCUIT BOARD ADJUSTMENT
  1. Battery Empty and Shutoff Voltage Adjustment · · · · · · · · · · · · · · 3-13
  2. A5V Adjustment · · · · · · · · · · · · 3-13
  3. REF9V Adjustment · · · · · · · · · · · 3-13
  4. FE OSCILLATION FREQUENCY Adjusment · · 3-13
ADJUSTMENT PARTS LOCATIONS · · · · · · · · · · 3-14
6. DEBUGGING THE VID/ENC/DIG CIRCUIT BOARDS · · · · · · · · · · · · · · · · · · 3-17

CHAPTER 4 MECHANISM ADJUSTMENT

LIST OF TAPES AND JIGS · · · · · · · · · · · 4-1
ADJUSTMENT PARTS LOCATIONS · · · · · · · · · 4-2
LIST OF MECHANISM ADJUSTMENT · · · · · · · · 4-3
1. MECHANISM COMPONENTS ADJUSTMENT
  1-1 Mechanism State Switch Adjustment · · · 4-4
2. TAPE TRANSPORT SYSTEM COMPONENTS ADJUSTMENT
  2-1 Reel Disk Height Adjustment · · · · · · 4-5
  2-2 Tension Pole Position and Tension Adjustment · · · · · · · · · · · 4-6
  2-3 Guide Pole Height Adjustment · · · · · · 4-7
  2-4 Guide Roller Height Adjustment · · · · · 4-8
  2-5 Audio/Control (A/C) Head Adjustment · · 4-9
  2-6 Transport Component Overall Adjustment 4-11
  2-7 X-Value Adjustment · · · · · · · · · · · 4-14
  2-8 Adjustment after Replacing Cylinder (Video Heads) · · · · · · · · · · · · · 4-16
  2-9 Tension/Torque Checks · · · · · · · · · 4-17
MAINTENANCE/INSPECTION PROCEDURE · · · · · · · 4-18
  1. Required Maintenance · · · · · · · · · · 4-18
  2. Scheduled Maintenance · · · · · · · · · 4-18
  3. Check before Starting Repairs · · · · · 4-18
  4. Tools Needed for Inspection and Maintenance · · · · · · · · · · · · · · 4-18
  5. Maintenance Procedures · · · · · · · · · 4-18
  6. Inspection Locations · · · · · · · · · · 4-20

CHAPTER 5 SCHEMATIC & CIRCUIT DIAGRAMS

SCHEMATIC/CIRCUIT BAORD DIAGRAM · · · · · · · 5-1
SERVICE MANUAL ABBREVIATION LIST · · · · · · · 5-2
SEMICONDUCTOR COFIGURATION · · · · · · · · · · 5-4

	SCHEMATIC DIAGRAM	CIRCUIT BOARD
INTERNAL WIRING DIAGRAM · · · · · ·	5-6	–
FUNCTION SW · · · (FSW P.C.B) · · ·	5-9	5-64
PBK · · · · · · · · (PBK P.C.B) · · ·	5-12	5-64
PREAMP · · · · · · · · · · · · · · · ·	5-13	–
SPF · · · · · · · · (SPF P.C.B) · · ·	5-15	5-66
REM · · · · · · · · (REM P.C.B) · · ·	5-16	5-67
DMD · · · · · · · · (DMD P.C.B) · · ·	5-18	5-62
REG · · · · · · · · (REG P.C.B) · · ·	5-20	5-66
SC · · · · · · · · (SC P.C.B) · · ·	5-26/31	5-71
T/S · · · · · · · · (T/S P.C.B) · · ·	5-23	5-68
SYSTEM CONTROL-I (MAS P.C.B) · · ·	5-21	5-68
SYSTEM CONTROL-II (MAS P.C.B) · · ·	5-24	5-68
WYC · · · · · · · · (MAS P.C.B) · · ·	5-25	5-68
SERVO · · · · · · · (MAS P.C.B) · · ·	5-27	5-68
JACK · · · · · · · (MAS P.C.B) · · ·	5-30	5-68
REG · · · · · · · · (MAS P.C.B) · · ·	5-31	5-68
IPP · · · · · · · · (IPP P.C.B) · · ·	5-32	5-71
AUDIO-I · · · · · (MAS P.C.B) · · ·	5-33	5-68
AUDIO-II · · · · · (MAS P.C.B) · · ·	5-36	5-68
VID-1/2 · · · · · · (VID P.C.B) · · ·	5-39	5-72
VID-2/2 · · · · · · (VID P.C.B) · · ·	5-42	5-72
PB COLOR PROCESS (ENC P.C.B) · · ·	5-44	5-74
PB VIDEO · · · · · (ENC P.C.B) · · ·	5-46	5-74
COLOR ENCODER · · (ENC P.C.B) · · ·	5-49	5-74
DIG-1/3 · · · · · (DIG P.C.B) · · ·	5-52	5-76
DIG-2/3 · · · · · (DIG P.C.B) · · ·	5-55	5-76
DIG-3/3 · · · · · (DIG P.C.B) · · ·	5-58	5-76

WAVEFORMS
  VID · · · · · · · · · · · · · · · · · · · 5-41
  ENC · · · · · · · · · · · · · · · · · · · 5-45
  DIG · · · · · · · · · · · · · · · · · · · 5-60

CHAPTER 6 PARTS LIST

REPLACEMENT PARTS LIST
  ELECTRICAL PARTS LIST · · · · · · · · · · · 6-1
  MECHANICAL PARTS LIST · · · · · · · · · · · 6-23
EXPLODED VIEWS
  CABINET SECTION · · · · · · · · · · · · · · 6-25
  CASSETTE LOADING SECTION · · · · · · · · · 6-26
  CHASSIS SECTION · · · · · · · · · · · · · · 6-27

CHAPTER 7 VL-AC10

1. DISASSEMBLY · · · · · · · · · · · · · · · · 7-1
  1-1 Top Cover Removal · · · · · · · · · · · 7-1
  1-2 Front Panel Removal · · · · · · · · · · 7-1
  1-3 Rear Panel Removal · · · · · · · · · · 7-1
  1-4 Battery Compartment Removal · · · · · · 7-1
  1-5 Main Circuit Board Removal · · · · · · 7-1
2. ELECTRICAL ADJUSTMENT · · · · · · · · · · · 7-2
  2-1 Preparation for Adjustment · · · · · · 7-2
  2-2 Charge Overvoltage Adjustment · · · · · 7-2
  2-3 DC OUT Output Voltage Adjustment · · · 7-2
  2-4 Adapter Mode Overcurrent Adjustment · · 7-2
  2-5 Charge Constant Current Adjustment · · 7-2
SCHEMATIC DIAGRAM · · · · · · · · · · · · · · 7-3
CIRCUIT BOARD DIAGRAM · · · · · · · · · · · · 7-6
ELECTRICAL PARTS LIST · · · · · · · · · · · · 7-7
MECHANICAL PARTS LIST · · · · · · · · · · · · 7-8
EXPLODED VIEW · · · · · · · · · · · · · · · · 7-9

CHAPTER 8 VL-EC10/EC20

MECHANICAL PARTS LIST · · · · · · · · · · · · 8-1
EXPLODED VIEW · · · · · · · · · · · · · · · · 8-2

SAFETY PRECAUTIONS

NOTICE: Comply with all cautions and safety related notes located on or inside the cabinet and on the chassis.

1. When replacing a chassis in the instrument, all the protective devices must be put back in place, such as barriers, non-metallic knobs, adjustment and compartment covers/shields, isolation resistors/capacitors, etc.
2. When service is required, observe the original lead-dress. Extra precautions should be taken to assure correct lead dress in the high voltage circuit.
3. Always use the manufacturer's replacement components. Especially critical components as indicated on the circuit diagram should not be replaced by other manufacturer's. Furthermore, where a short-circuit has occurred, replace those components that indicate evidence of overheating.
4. Before returning an instrument to the customer, the service technician must thoroughly test the unit to be certain that it is completely safe to operate without danger of electrical shock, and be sure that no protective device built into the instrument by the manufacturer has become defective or inadvertently defeated during servicing.

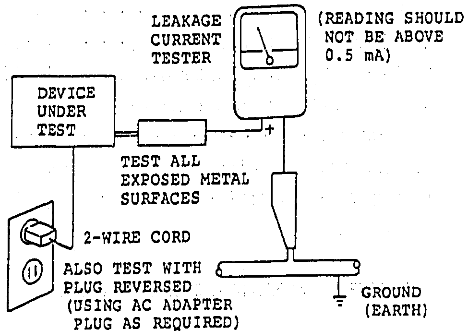
Therefore, the following checks should be performed for the continued protection of the customer and service technician.

Leakage Current Cold Check

With the AC plug removed from the AC120V, 60Hz source, place a jumper across the two plug prongs. Turns the AC power switch on. Using an insulation tester (DC500V), connect one lead to the jumpered AC plug and touch the other lead to exposed metal parts (antennas, screwheads, metal overlays, control shafts, etc.), particularly any exposed metal part having a return path to the chassis. Exposed metal parts having a return path to the chassis should have a minimum resistor reading of 0.3 Mohm and a maximum resistor reading of 5 Mohm. Any resistor value below or above this range indicates an abnormality which requires corrective action. Exposed metal parts not having a return path to the chassis will indicate an open circuit.

Leakage Current Hot Check

Plug the AC line cord directly into a AC120V, 60 Hz outlet (do not use an isolation transformer for this check). Turn the AC power switch on. Using a "Leakage Current Tester", measure for current from all exposed metal parts of the cabinet (antennas, screwheads, metal overlays, control shaft, etc.), particularly an exposed metal part having a return path to the chassis, to a known ground (earth) (water pipe, conduit, etc.). Any current measured must not exceed 0.5 mA.


LEAKAGE
CURRENT
TESTER
(READING SHOULD NOT BE ABOVE 0.5 mA)
DEVICE UNDER TEST
+
TEST ALL EXPOSED METAL SURFACES
2-WIRE CORD
ALSO TEST WITH PLUG REVERSED (USING AC ADAPTER PLUG AS REQUIRED)
GROUND (EARTH)

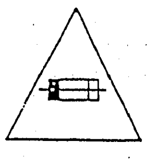
AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE UNIT TO THE CUSTOMER.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts have special safety-related characteristics. These are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.
Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.
The use of a substitute replacement component which does not have the same safety characteristics as the HITACHI recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards. Product safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current HITACHI Service Manual. A subscription to, or additional copies of, HITACHI Service Manual may be obtained at a nominal charge from HITACHI SALES CORPORATION.

CAUTION AGAINST FUSE REPLACEMENT



CAUTION : FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE AMPERE, VOLT FUSE.

ATTENTION : AFIN D'ASSURER UNE PROTECTION PERMANENTE CONTRE LES RISQUES D'INCENDIE, REMPLACER UNIQUEMENT PAR UN FUSIBLE DE MEME TYPE ET DE AMPERES VOLTS.

This symbol indicates Fast Operating Type Fuse.

GENERAL DESCRIPTION

VL-S100

1. Optional Accessories

1. Camera : EP-C1/C2: CK-1B professional-use three-plate camera made by Hitachi Denshi
2. Battery pack (VL-BP12) : 12V/1.7A NiCd
3. AC adapter/charger (VL-AC10)
4. DC connection cable : XLR4P (provided with AC adapter)
5. Remote control
6. Editing controller : Compatible with RM-450 (compatible with some of functions)
7. Camera-VCR cable : 14P
8. 14-pin - 10-pin conversion cable
9. Time code generator
10. RS-422 connection cable : (provided with the editing controller)

2. Inputs

Source		Jack	Impedance	
MIC	CH1	φ6	4.7kΩ	-70dBs
	CH2	φ6	4.7kΩ	-70dBs
AUDIO IN (LINE)	CH1	US pin	47kΩ	-8dBs unbalanced (0dBs-0.775Vrms)
	CH2	US pin	47kΩ	-8dBs unbalanced
CAMERA		Camera terminal	4.7kΩ	-20dBs balanced (14 pins)
TIME CODE.		US pin	56kΩ	1.0Vp-p
DC IN		XLR4P		12V
REMOTE2		RS-422		9 pins Transfer speed: 38.4kbaud
VIDEO IN		BNC	75Ω	1.0Vp-p
S-VHS IN		S connector	75Ω	Y: 1.0Vp-p unbalanced C: 0.286 Vp-p unbalanced
REMOTE1				
External battery input				

3. Outputs

Source		Jack	Impedance	
AUDIO OUT (LINE)	CH1	US pin	1.5kΩ	-8dBs
	CH2	US pin	1.5kΩ	-8dBs
HEADPHONE		φ3	8Ω	-50~-20dBs stereo
VIDEO OUT		BNC	75Ω	1.0Vp-p
TIME CODE		US pin	5.6Ω	0.2Vp-p
S-VHS OUT		S connector	75Ω	Y: 1.0Vp-p unbalanced C: 0.286 Vp-p unbalanced
SOURCE OUT		BNC	75Ω	1.0Vp-p

4. Functions and Operations

RECORDING :

Press the PLAY button while holding the REC button depressed. (It is possible to press the PLAY and REC buttons simultaneously.) The REC indicator lights during recording.

When the record button is pressed with a cassette without its safety tab loaded, the cassette is ejected.

PLAYBACK :

Press the PLAY button to start playback. The PLAY indicator lights during playback.

PAUSE :

Press the PAUSE button during recording. The tape is rewound slightly and stops. The PAUSE lamp lights during pause.

Press the PAUSE button again to release the pause mode and restart recording.

When the VCR is left in the pause mode for 5 minutes, the mechanism is shifted to the REC PAUSE position and the pressure roller is released. The VCR enters the power save mode. When the VCR is left in the pause mode within 5 minutes, the VCR stops. The pressure roller is kept compressed.

STILL :

Press the PAUSE button during play. The tape stops immediately and the VCR enters the still play mode.

Press the PAUSE button again to restart normal playback.

When the VCR is left in the play/pause mode for 5 minutes or more, several frames are advanced and the VCR enters the still play mode again.

FAST FORWARD :

Press the FF button in the stop mode. The tape is fast forwarded. The FF indicator lights during fast forwarding.

When the tape reaches the end, the VCR enters the stop mode and the TAPE END indicator lights.

REWIND :

Press the REW button in the stop mode. The tape is rewound. The REW indicator lights during rewinding.

CUE :

Press the FF button during play. The tape is searched in the forward direction at a speed 5 times the normal speed.

Press the PLAY button again to resume play.

The PLAY indicator lights and the FF indicator flashes during cue.

REVIEW :

Press the REW button during play. The tape is searched in the reverse direction at a speed 5 times the normal speed. Press the PLAY button again to resume play.

The PLAY indicator lights and the REW indicator flashes during review.

F. ADV :

Press the SLOW button once during still play. One frame is advanced.

When the SLOW button is held depressed, the VCR enters the continuous frame advance mode at a speed 1/30 times the normal speed.

MONITORING DURING RECORDING :

Press the REC MONI button during recording. Part of picture recorded immediately before is displayed on the monitor screen together with the picture currently being recorded.

Release the button to restore the normal picture. You can select a full size or 1/4 size picture using the select switch on the side panel.

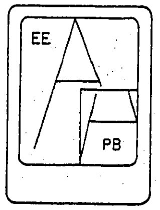


Fig. 1-1 Recording Monitor

AUTO REPEAT :

Press START of the AUTO REPEAT button on the front panel to set the start of the section to be repeated and press END to set the end of the section to be repeated, then rewind the tape. The VCR repeats the playback of the specified section automatically.

When START is pressed, the display is set to a linear time counter and "R" flashes as the first character, and after END is set, "R" lights. AUTO REPEAT is released when the power is turned off, the EJECT button is pressed, the REC button is pressed or the START/END buttons are pressed simultaneously.

STOP :

When the STOP button is pressed, all operation is stopped.

SLOW :

When the SLOW button is pressed during play, the tape is played in the slow mode at a speed 1/5 times the normal speed. Press the PLAY button to resume normal play.

AUDIO DUBBING :

Press the PAUSE button during play to set to still play. Then press the DUB button, and while holding it, press the PLAY button. The VCR enters the audio dubbing pause mode. Press the PAUSE button to start audio dubbing.

The dubbed audio signal is recored on only the CH-2 linear track. The Hi-Fi track remains unmodified.

The PLAY and DUB indicators light simultaneously during audio dubbing.

When the counter reaches zero during audio dubbing, the tape stops and audio dubbing is released.

VIDEO DUBBING :

Press the PAUSE button during paly to set to still play. Then press the DUB button, and while holding it, press the REC button. The VCR enters the video dubbing pause mode. Press the PAUSE button to start video dubbing.

The new video and Hi-Fi audio signals are recorded. The linear audio track remains unmodified.

The PLAY, REC and DUB indicators light simultaneously during video dubbing.

5. Major Technologies

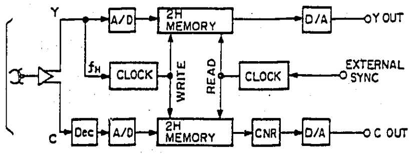
TBC :

This VCR incorporates a TBC (Time Base Corrector) function. This TBC function removes jitter and also synchronizes with an external video source. Two line memories are used as delay devices and a gate array is used in the control section.

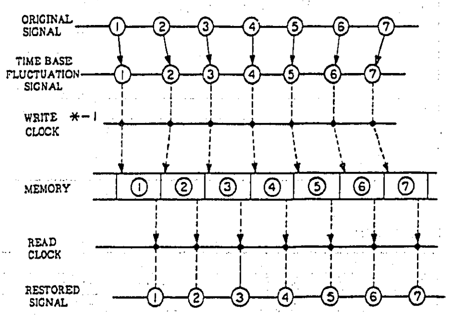
POINTS

- External sync function which is indespensable for editing
- Jitter correction up to 2H possible
- The edit and chroma systems are installed independently. Y/C separate characteristics assured.
- 2,048 words × 8 bits specifications
- Chroma noise reducer (CNR) handled

The basic configuration is shown in the diagram below.


Y
A/D
2H MEMORY
D/A
Y OUT
fH
CLOCK
WRITE
READ
CLOCK
EXTERNAL SYNC
C
Dec
A/D
2H MEMORY
CNR
D/A
C OUT

TIMING CHART



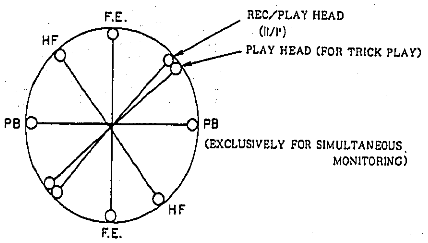
*-1 The writing clock signal is synchronaized with the input signal.

Fig. 1-2 TBC

CYLINDER :

Name	Number	Material
Record/play head	2 } DA4	Super amorphous
Play head(trick play)	2	Super amorphous
Flying erase head	2	Ferrite
Monitor head	2	Super amorphous
Hi-Fi head	2	Ferrite

LOCATIONS OF HEADS


F.E.
HF
REC/PLAY HEAD (II/P)
PLAY HEAD (FOR TRICK PLAY)
PB
PB (EXCLUSIVELY FOR SIMULTANEOUS MONITORING)
HF
F.E.

REC/PLAY AMPLIFIERS

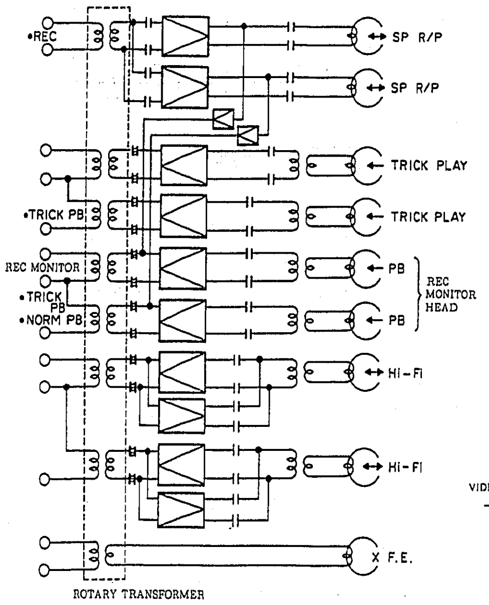

•REC
SP R/P
SP R/P
TRICK PLAY
•TRICK PB
TRICK PLAY
REC MONITOR
•TRICK PB
•NORM PB
PB
PB
REC MONITOR HEAD
HI-FI
HI-FI
F.E.
ROTARY TRANSFORMER

Fig. 1-3 Cylinder

SELECTION OF RECORDING/PLAYBACK SIMULTANEOUS MONITORING HEADS :

POINTS

- Playback is possible while recording
- Rotary recording and playback amp system which are the tchnologies used in VCRs for broadcast stations are used.
- Ultra-high performance amorphous monitor head
- Monitor picture switching system between full -size picture and small picture.

Since the recording and playback monitor heads are in different positions, a playback head switching signal is required when monitoring the recording and playback signals simultaneously. This VCR uses independent head switching signals for recording and playback, therefore, it uses a switching signal in common for simultaneous monitoring.

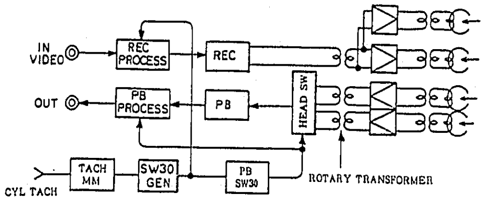

IN VIDEO
OUT
REC PROCESS
REC
PB PROCESS
PB
HEAD SW
TACH MM
SW30 GEN
PB SW30
CYL TACH
ROTARY TRANSFORMER

Fig. 1-4 Recording/Playback Simultaneous Monitoring

MULTI-SOURCE EDITING :

Since the input signal and playback signals are gen-locked, it is possible to construct an editing system when various video equipment is combined.

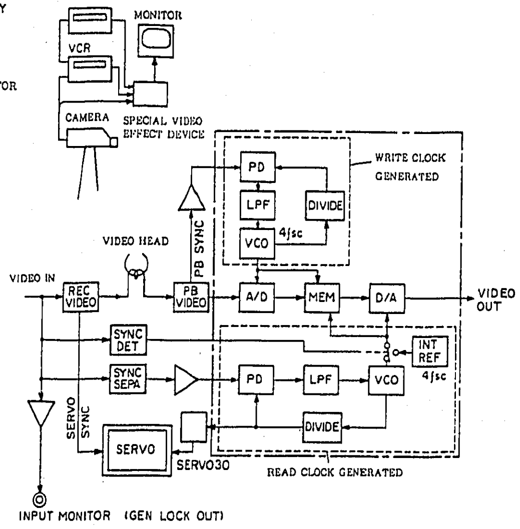

MONITOR
VCR
CAMERA
SPECIAL VIDEO EFFECT DEVICE
WRITE CLOCK GENERATED
PD
LPF
DIVIDE
VCO
4fsc
VIDEO HEAD
PB SYNC
VIDEO IN
REC VIDEO
PB VIDEO
A/D
MEM
D/A
VIDEO OUT
SYNC DET
INT REF
SYNC SEPA
PD
LPF
VCO
4fsc
SERVO SYNC
SERVO
SERVO30
DIVIDE
READ CLOCK GENERATED
INPUT MONITOR (GEN LOCK OUT)

Fig. 1-5 Multi-source Editing

FRAMING SERVO :
When the even or odd fields overlap before and after an assembly edit point, the H. sync signal is drifted by 0.5H, causing skew. Framing servo is used so that the fields are discriminated and the even and odd fields are recorded alternately before and after an assembly edit point.
There are two systems of framing servo - the field fixing system and field variable system. This VCR uses the field fixing system.

Heads CH-1 (positive azimuth): Odd field
CH-2 (negative azimuth): Even field

Note: When assemble editing with a section recorded by another system, assemble editing using framing servo cannot be done.

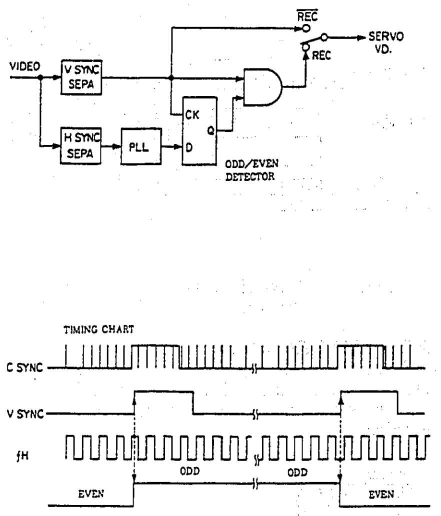

REC
SERVO VD.
REC
VIDEO
V SYNC SEPA
H SYNC SEPA
PLL
CK
Q
D
ODD/EVEN DETECTOR
TIMING CHART
C SYNC
V SYNC
fH
ODD
ODD
EVEN
EVEN

Fig. 1-6 Framing Servo

CHROMA NOISE REDUCER :
A digital chroma noise reducer is used to improve the chroma S/N. Differing from the 1H delay type comb filter, this chroma noise reducer uses the correlation of the next field and can play back a chroma signal with greater fidelity.

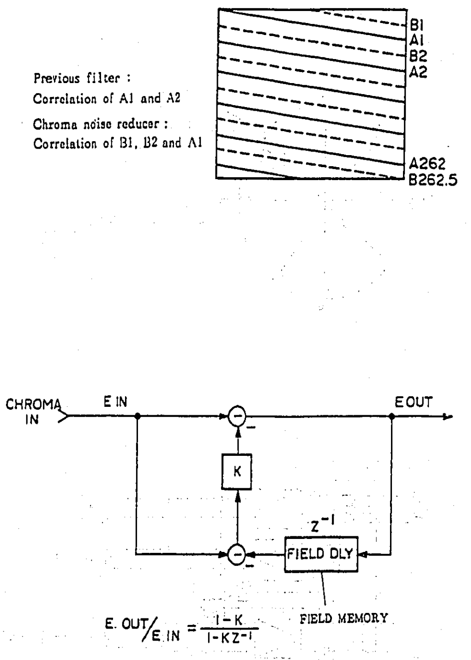

B1
A1
B2
A2
A262
B262.5
Previous filter :
Correlation of A1 and A2
Chroma noise reducer :
Correlation of B1, B2 and A1
CHROMA IN
E IN
E OUT
K
Z⁻¹
FIELD DLY
FIELD MEMORY
E. OUT/E. IN = (1-K)/(1-KZ⁻¹)

Fig. 1-7 Chroma Noise Reducer

6. Operation Switches, Indicators and Controls on Front Panel

— Upper Stage —

[U1] POWER (ON, OFF) :
Set to ON to turn the VCR power on.

[U2] EJECT :
Press this button with power on to eject the cassette.

— Middle Stage —

[M1] BATT (Battery Alarm) :
When the battery capacity becomes low during recording, the indicator flashes. When the voltage drops below 10.5V, the VCR stops and the power is turned off.

[M2] TAPE END (Tape End Alarm) :
When only a few minutes of tape are left, the indicator flashes. When the tape reaches the end, the indicator lights and the tape stops.

[M3] AUTO OFF (AUTO OFF Indicator) :
When the tape transport is abnormal or condensation occurs, this indicator flashes or lights to warn the operator. When condensation occurs, the tape stops and no operation other than EJECT is accepted. The indicator lights and the details of the trouble are displayed in the display. When the mechanism is abnormal (reel lock, cylinder lock, mechanism lock, tape loading/unloading disabled), the indicator flashes at a frequency of 3 - 4Hz. All operations including EJECT are disabled and the power is turned off after about 10 seconds.

[M4] LCD DISPLAY :
This displays the tape remaining time, linear time counter or tape counter using a toggle operation. This LCD displays the tape-in indication, memory and battery remaining power. "R" is displayed as the first character in the auto repeat mode.

[M5] STOP :
Press this button to stop the tape transport.

[M6] PLAY :
Press this button to play tape.

[M7] REC :
Press this button and the PLAY button simultaneously to enter the record mode.

[M8] REC MONITOR :
Press this button during recording; the picture which was just recorded can be played back at part of the screen. Press the button to again restore the EE picture.

[M9] FF :
Press this button in the stop mode to fast forward the tape. Press during play for forward search.

[M10] REW :
Press this button in the stop mode to rewind the tape. Press during play for reverse search.

[M11] DUB :
Press this and the PLAY (REC) button simultaneously in the audio (video) dub mode.
Still play → PLAY + DUB → Audio dubbing
Still play → REC + DUB → Video dubbing

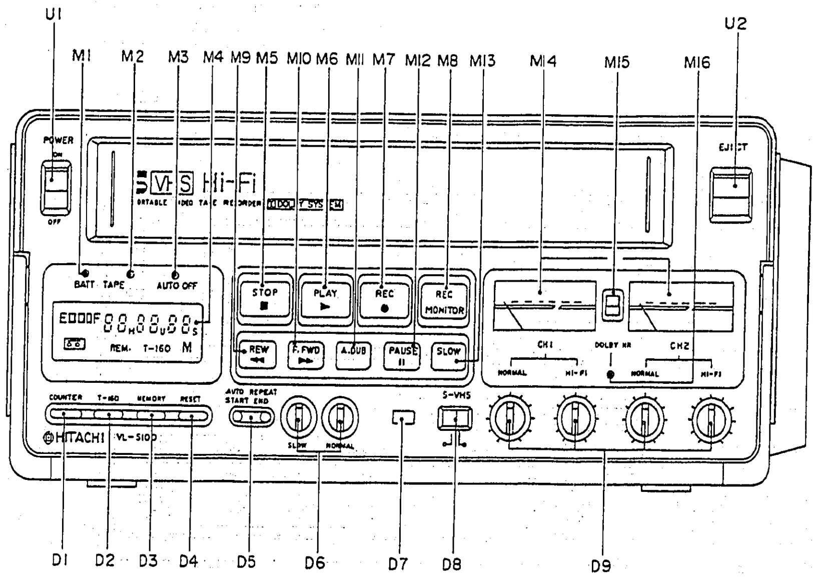

U1
U2
M1
M2
M3
M4
M9
M5
M10
M6
M11
M7
M12
M8
M13
M14
M15
M16
POWER
ON
OFF
EJECT
S VHS Hi-Fi
BATT
TAPE
AUTO OFF
STOP
PLAY
REC
REC MONITOR
REW
F.FWD
A.DUB
PAUSE
SLOW
REM.
T-160
CH1
DOLBY NR
CH2
NORMAL
HI-FI
COUNTER
T-160
MEMORY
RESET
AUTO REPEAT START END
SLOW
NORMAL
S-VHS
HITACHI
VL-S100
D1
D2
D3
D4
D5
D6
D7
D8
D9

Fig. 1-8 Layout of Switches on Front Panel

[M12] PAUSE :

Press this button to stop the tape temporarily in the record and play modes. When it is pressed during recording, the tape is rewound slightly and stopped temporarily. When it is pressed during play, a still picture is obtained. When pressed again, the original mode(recording or play) is restored.

[M13] SLOW :

Press this button during play to set the VCR to the slow mode at a speed 1/5 times the normal speed. Press the PLAY button to resume play. Press slow during still play to advance a frame.

[M14] VU METERS (CH-1, CH-2) :

These meters show the audio level. The CH-1 and CH-2 inputs are indicated independently.

[M15] Hi-Fi/NORMAL :

This switches between Hi-Fi sound and linear sound during recording and playback.

[M16] DOLBY NR INDICATOR :

This lights when the Dolby NR switch is turned on. The audio signal is processed by Dolby NR in recording and playback.

— Lower Stage —

[D1] COUNTER :

This switch permits the selection of the tape remaining time, tape counter or linear time counter.The display is changed by toggle operation every time the switch is pressed.

[D2] T160 :

When a T-160 tape is used for recording and playback, press this button to display the tape remaining time correctly. "T-160" is displayed in the LCD. (This function operates only for the remaining time display.)

[D3] MEMORY :

When this button is pressed, "M" is displayed and the counter memory function operates. When the counter reading reaches zero during fast frorward or rewind, the tape stops.

[D4] RESET :

This button resets the tape or linear time counter reading to zero.

[D5] AUTO REPEAT(START, END) :

Use the START and END buttons to set the start and end points of the section to be repeated and press the PLAY button. The VCR automatically plays the specified section of the tape repeatedly

[D6] TRACKING (NORMAL, SLOW) :

NORMAL : When noise occurs in the played back picture, adjust this control so the picture is optimum.
SLOW : Adjust this control during slow to eliminate noise.

[D7] S-VHS SWITCH :

Set to AUTO to record an S-VHS cassette. Set to OFF to record a VHS cassette.

[D8] S-VHS (AUTO/OFF) :

This switches the recording system.
AUTO : When an S-VHS cassette is inserted,it is recorded in the S-VHS format, and when a VHS cassette is inserted, it is recorded in the VHS format.
OFF : When an S-VHS cassette is inserted, it is recorded in the VHS format.

[D9] REC LEVEL CONTROLS (CH-1 Hi-Fi/NORMAL, CH-2 Hi-Fi/NORMAL) :

The CH-1 and CH-2 controls can adjust the audio levels of the Hi-Fi and normal tracks independently.
Hi-Fi : The controls adjust the audio level recorded on the Hi-Fi tracks.
NOR : The controls adjust the audio level to be recorded on the linear tracks.

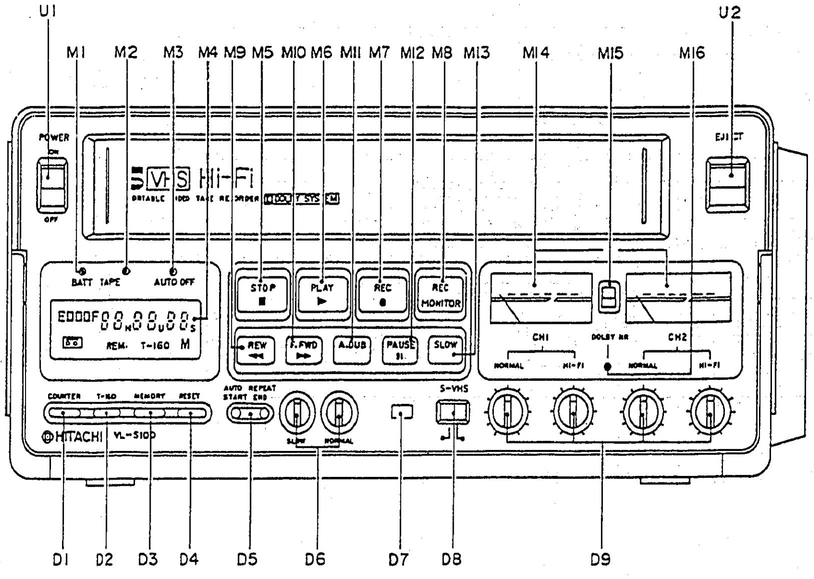

U1
U2
M1
M2
M3
M4
M9
M5
M10
M6
M11
M7
M12
M8
M13
M14
M15
M16
POWER
EJECT
S-VHS Hi-Fi
BATT
TAPE
AUTO OFF
STOP
PLAY
REC
REC MONITOR
REW
F.FWD
A.DUB
PAUSE
SLOW
CH1
DOLBY NR
CH2
NORMAL
HI-FI
COUNTER
T-160
MEMORY
RESET
AUTO REPEAT
START END
S-VHS
SLOW
NORMAL
HITACHI
VL-S100
D1
D2
D3
D4
D5
D6
D7
D8
D9

Fig. 1-8 Layout of Switches on Front Panel

7. Operation Switches and Jacks on Side Panel

— Upper Stage —

[U1] EDIT (ON, OFF) :

Set to ON when using this VCR as a playback machine in editing. The edited picture has clear edges. This switch has no effect during recording.

[U2] DOLBY NR (ON, OFF) :

Set to ON to record the signal using the Dolby NR circuit.

Set to ON to play back a tape recorded using the Dolby NR circuit.

Set to OFF to play back a tape not recorded using the Dolby NR circuit.

[U3] FRAMING (ON, OFF) :

Set to ON to record odd-field video signals on the CH-1 video tracks. Set to OFF to record an input signal such as a random interlaced signal other than the EIA standard signal.

[U4] LIMITER (ON, OFF) :

Set to ON when recording a high input-level audio signal; an optimum level is obtained. Normally set to OFF.

[U5] MONITOR SIZE (SPLIT, NORMAL) :

This switch selects the size of the picture which is monitored simultaneously with the picture being recorded, in 2 steps.
SPLIT : The recorded picture is monitored occupying a quarter of the TV screen.
NORMAL : The recorded picture is monitored to full the screen.

[U6] CAMERA (VBS, Y/C) :

When the VIDEO INPUT switch is set to CAMERA, this switch selects composite video or Y/C separate camera inputs.

[U7] OPERATION SELECT SWITCH (LOCAL, REMOTE1, REMOTE2) :

This switches the remote operation between REMOTE 1 and REMOTE 2. Set to LOCAL when operating the switches on the VCR.

[U8] REMOTE TERMINALS (REMOTE1, REMOTE2) :

Connect remote controllers to these terminals.
REMOTE1 : An optional remote controller can be connected here.
REMOTE2 : This outputs and receives control signals conforming to RS-422. An external controller (example, an editing controller) can be connected here.

[U9] CAMERA JACK :

A suitable camera is connected to this 14-pin terminal. (See Table 1)

[U10] DC IN JACK :

An external power supply is connected here.
Capacity : 12V, 5A

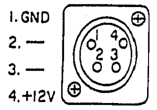

1. GND
2. —
3. —
4. +12V
1
2
3
4

Fig. 1-10 DC IN Jack

[U11] SC PHASE :

Used when editing multi sources. This control corrects the drift of the phase of the played back subcarrier with respect to that the external signal.

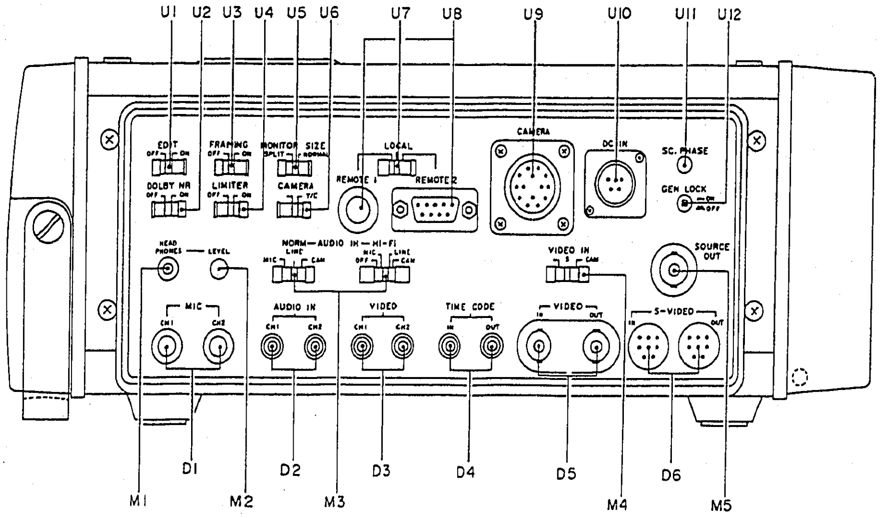

U1
U2
U3
U4
U5
U6
U7
U8
U9
U10
U11
U12
EDIT
FRAMING
MONITOR SIZE
SPLIT NORMAL
LOCAL
REMOTE 1
REMOTE 2
CAMERA
DC IN
SC PHASE
GEN LOCK
DOLBY NR
LIMITER
CAMERA
Y/C
HEAD PHONES
LEVEL
NORM—AUDIO IN—HI-FI
LINE
MIC
CAM
VIDEO IN
SOURCE OUT
MIC
CH1
CH2
AUDIO IN
VIDEO
TIME CODE
IN
OUT
S-VIDEO
D1
D2
D3
D4
D5
D6
M1
M2
M3
M4
M5

Fig. 1-9 Layout of Switches on Side Panel

9. Various Editing Operations

ASSEMBLE EDITING :

This function permits recording a new program section following a previous recording. The assemble editing allows the simultaneous editing of video/Hi-Fi audio (CH-1, CH-2), CH-1 and CH-2 linear audio and the control signal. (It is possible to switch Hi-Fi sound on or off.)

Notes :

1. A cassette without its safety tab cannot be edited.
2. The tracking control of the source deck must be set to the optimum position.
3. Set the FRAME switch of the editing deck to ON.

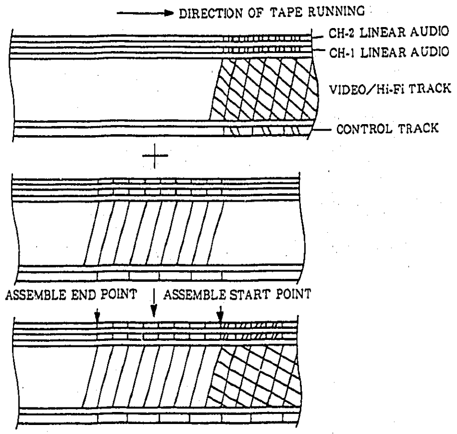


Fig. 1-13 Assemble Editing

VIDEO DUB EDITING :

This function inserts a new program into the middle of the previously recorded tape. (Hi-Fi audio cannot be inserted on its own.)

New signals are recorded on the video tracks and Hi-Fi tracks in insert editing and the previous sound remains on the linear tracks.

Operation Procedure

1. Connect external equipment.
2. Use the VIDEO IN select switch to select the video input.
3. Use the AUDIO IN select switch (Hi-Fi) to select the sound to be recorded on the Hi-Fi track.
4. Load a previously recorded cassette and play it back.
5. Reset the tape counter to "0000" at the video dubbing end point and press the MEMORY button so that "M" is displayed.
6. Rewind the tape and play the tape at the start point.
7. Press the PAUSE button at the start point to set the VCR to the still play mode and then press the REC and PAUSE buttons simultaneously. The VCR enters the insert pause mode.
8. Press the PAUSE button to start video dubbing. Video dubbing will be completed when the counter reaches "0000" and the VCR will stop automatically.

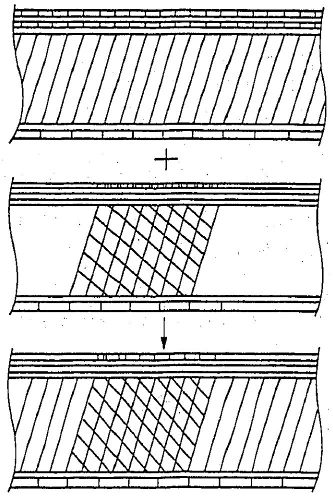


Fig. 1-14 Video Dub Editing

AUDIO DUB EDITING :

This function permits recording new sound on the previously recorded tapes.

The linear sound is recorded on the CH-2 tracks in audio dub editing and the sound previously recorded on the CH-1 and Hi-Fi tracks remain as it is.

Operation procedure

1. Connect external equipment.
2. Use the AUDIO IN select switch (NORM) to select the input.
3. Insert a previously recorded cassette and play it back.
4. Press the PAUSE button at the section where audio dubbing is to start.
5. Press the DUB and PLAY buttons simultaneously to set the VCR to the audio dub pause mode.
6. Press the PAUSE button to start audio dubbing.
7. Press the STOP button to stop audio dubbing.

When using the counter memory function, follow the procedure below after playing a recorded tape.

1. Press the PAUSE (or STOP) button to stop the tape at the section where audio dubbing is to stop.
2. Press the MEMORY button to display "M" and press the RESET button to reset the counter to "0000".
3. Press the REW button to rewind the tape to the dubbing start point.
4. Set the VCR to the play pause mode at the dubbing start point and perform step 5 and later as shown above.

10. Features and Electrical Specifications

10-1 Features

1. Handles input voltages of AC 100~240V (the voltage is different for each destination)
2. Rating 13V/4A maximum
3. XLR type DC output is used.
4. Two batteries are charged in sequence.
5. Fast charging is possible in about one hour.
6. Control system with -ΔV
7. Various protection functions incorporated
8. Switching between adapter mode and charger mode

10-2 Control system

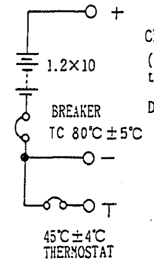
The VL-AC10 can charge the VL-BP12 battery (equivalent to the NP-1A) and drive a VCR via the cable provided.

(1) Charge system

1. The AC input is converted to a DC power supply which has functions as a constant power voltage and constant current source, which allows the VL-AC10 to be used as an AC adapter or a charger.
2. The charger uses a -ΔV detection system. Fast charging (in about 80 minutes) is possible.
3. Order of charging :
   After charging of the battery which was attached first is completed, the other battery is charged. When the power is turned on, however, charging starts from 1.
   When one battery is charged, charging stops after the battery has been charged. * When two batteries are charged, trickle charging is performed after charging is completed.
   When the VL-AC10 is supplying power to a VCR, trickle charging is not performed.
4. The AC adapter and charger do not work at the same time.
   * When two batteries are attached, the battery which is not being fast charged is trickle charged (to prevent overcurrent at the start of charging an over-discharged battery).

(2) Batteries that can be charged

1. The VL-BP12 battery (equivalent to the NP-1A) can be charged.
2. The following shows the internal connection of a battery. The ambient temperature of a battery should be between 0℃ and 35℃.



Charging : Between ⊕ and ⊖
(Prevents the thermostat from operating due to the temperatures)

Discharging : Between ⊕ and ⊖

10-3 Electrical Specifications

(1) Specifications of input section

Rated input voltage : AC 100~240V
Input voltage range : AC 90~264V
} The rated input is different for each destination

Japan : 100V
U.S.A : 120V

Input frequency : 50~60Hz
Input frequency range : 45~66Hz
Number of phases : Single phase
Surge current (Input current) : 50A peak or less (at AC 100V rated load at cold start)
Efficiency : 65% or more (at the rating input/output of AD adapter)
Measured with the DC cable provided
Rating of fuse : 250V/3A

(2) Specifications of AC adapter output section

Rating output voltage : +13V
Output voltage range : 12.3~13.8V
Rated output current : 4A maximum
Output current range : 0.5~7.5A (for one second or less at 5A or more)
Instantaneous voltage drop resistance characteristic :

When 100V is changed to 60V at 50Hz for two cycles, the VCR should not stop recording. There should be no abnormality such as smoke, flames, breakdown of VCR, latch of AC adapter, etc. When any instantaneous voltage drop or instantaneous shutoff occurs.

(3) Specifications of charger section

Charge current (constant current drive)

	Voltage at charge terminal	Charge current
Fast charging :	14~18.5V	1.8±0.05A
	3~14V	1.8±0.15A
Trickle charging :	14V	(600±15mA)

Maximum charge voltage :

When the voltage exceeds 19+0.7/-0.3V, fast charging is stopped. When two batteries are attached, trickle charging is done. The maximum voltage in trickle charging should be 19+0.7/-0.3V. When it exceeds 19+0.7/-0.3V, trickle charging is stopped.

-ΔV value :

When the battery terminal voltage stops rising and it drops from the peak voltage by about 130~210mV, fast charging is stopped.

Initial timer :

The -ΔV value is not detected for about 5 minutes after charging is started.

Protection timer :

When fast charging is not completed within 90 ±5 minutes, the timer operates to stop fast charging. The charge LED lights. When two batteries are attached, charging of the other battery is performed.

Defective contact protection :

When charging is not performed due to defective contact, an alarm indicator lights.

10-4 Detection Switches and Indicators

1. Two switches which detect that batteries are attached are incorporated.
2. DC jack : XLR4P
3. Mode select switch : Selects the adapter mode or battery charger mode.
4. AC cord jack : Three pins. The power cord plug has two pins (for Japan).
5. LEDs
   DC output LED : Lights when the adapter mode is selected.
   Power LED : Lights when the POWER switch is turned on.
   Abnormality indicator LED :
   Flashes when abnormality occurs.
   Charge indicator LED :
   Flashes during fast charging, lights after charging is completed and goes out when the battery is removed.

10-5 Output Protection Functions

(1) Adapter mode

Overload :

When a current of more than 110% the rated value flows for 3 seconds or more, the output is stopped and the abnormality indicator LED flashes.

Overvoltage :

When the voltage of more than 15V continues for 3 seconds or more, the output is stopped and the abnormality indicator LED flashes. This is reset when the POWER switch is turned on again.

(2) Charger mode

Open terminal voltage :

When 20~22V continues for more than 3 seconds, the output is stopped and the abnormality indicator LED flashes.

Low voltage :

When a voltage of less than 9V continues for more than 3 seconds after the initial timer setting time is completed, the output is stopped and the abnormality indicator LED flashes.

Abnormal current :

When a current of 2.7~3A continues for more than 3 seconds, the output is stopped and the abnormality indicator LED flashes.

Timer :

When fast charging is not completed within 90 ±5 minutes, the output is stopped and charging is stopped.

11. Features

1. Quick editing with JOG/SHUTTLE dial
2. The total time as well as the editing points are displayed.
3. Editing points can be located easily.
4. Preview editing and review editing
5. Trimming of the editing points is possible.
6. The preroll time is selectable.
7. A/B roll editing (only with VL-EC20)

12. Electrical Specifications

Automatic editing :
PREVIEW, EDIT, REVIEW, GO-TO, END

Manual control :
STOP, PLAY, PAUSE/STILL, REW, FF, STD-BY, EJECT REC (recorder only), EDIT (recorder only)

Time counter :
CTL 00:00:00:00~23:59:59:29(24)
or -4:00:00:00~19:59:59:29(24)

Editing accuracy :
CTL±2 frames

Preroll time :
3, 5 and 7 seconds (switchable)

Correction of editing points :
±1 frame shift

Details of display :
Counter, total time, IN, OUT

Tape protection :
When the VCR is left in the STILL mode for 5 minutes or more, the tape is fed for several frames automatically.

13. Names and Functions of Switches

POWER :
Turns the power on and off.

— Counter Display Section —

RESET :
Press to reset the counter. The IN and OUT points are also reset. Also press the button to reset the error display.

Indicators :

P1	P1 lights when the power is turned on.
P2	Switched by a select button.
SERVO	Lights when the servo lock of the player or recorder is lost.
IN/OUT	Flashes when no IN/OUT point is input for the player or recorder. Lights when all editing points are input.

Counter display :
Displays the position of tape by counting the CTL signals in hours/minutes/seconds and frames. The counter displays are provided for both the player and recorder.

Total button/lamp :
The lamp alternates between flashing and steady lighting every time the button is pressed. While it is flashing, the total time of recorder is displayed.

The total time is the time the tape was run in the recorder from the point where the reset button is pressed while the total time is displayed.

— Player/Recorder Control Sections —

P1, P2 :
Press to select the player to be controlled when an optional card is incorporated and two players are connected.

STD-BY R/P :
Press in the F.FWD or REW mode to set the VL-S100 to the stop mode.

EJECT R/P :
Press to remove the cassette.

PLAY R/P :
Press for the play mode.

PAUSE/STILL R/P :
Press during recording for pause and press during play for still play.

REW R/P :
Press to rewind the tape.

F.FWD R/P :
Press to fast forward the tape.

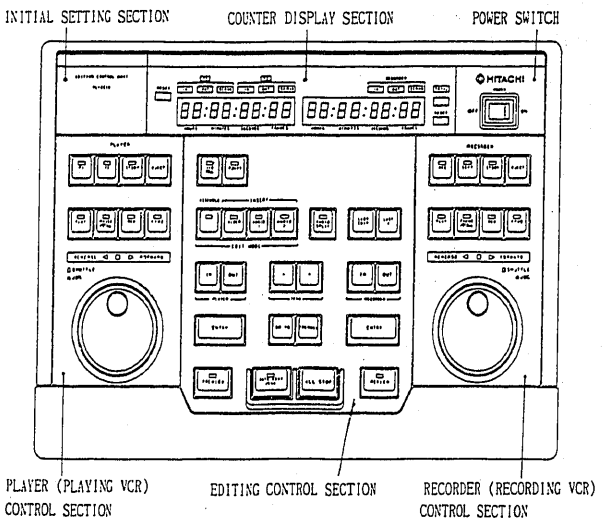


Fig. 1-15 Operation Range

JOG/SHUTTLE R/P :
These dials access the IN and OUT edit points easily during editing. They are concentric. Push in for the JOG mode and out for the SHUTTLE mode.

REC R :
Press together with the PLAY button to set the VCR to the record mode.

— Editing Control Section —

A/B ROLL :
Press for A/B roll editing when an optional card is incorporated.

P2→P1 :
Press for A/B roll editing starting with player 2.

ASSEMBLE :
Press for assemble editing.

INSERT :
Select the channel into which a signal is to be inserted in insert editing.

VIDEO : A video signal is inserted.
AUDIO-1: The normal audio channel is selected.
AUDIO-2: (AUDIO-2 only with VL-S100)

Button / Editing signal	VIDEO	AUDIO CH-1*	AUDIO CH-2
Video/Hi-Fi	ON	OFF	OFF
Video/Hi-Fi Normal audio CH-2	ON	OFF	ON
Normal audio CH-2	OFF	OFF	ON

* The VL-S100 cannot insert a signal to CH-1.

AUDIO SPLIT :
Press this button and input the AUDIO IN point for audio split editing. (The VL-S100 does not have this function.)

LAST EDIT :
Press to recall the counter readings of the last IN and OUT edit points.

LAST X:
When this button is pressed after the last edited IN and OUT points are checked by pressing the LAST EDIT button, the IN and OUT points which were set before the LAST EDIT button is pressed appear in the display.

IN/OUT :
Press the ENTRY button while holding the IN and OUT buttons depressed to register the IN and OUT points.

When only the IN and OUT buttons are pressed, the input IN and OUT points appear in the counter display.

ENTRY :
Press the IN and OUT buttons while holding this button depressed to input the IN and OUT points.

+/- (TRIM) :
Press this button while holding the IN and OUT buttons depressed to correct the IN and OUT points; they can be corrected in units of one frame.

GO-TO :
Press this button while holding the IN and OUT buttons depressed to move the tape to the IN and OUT points.

PREROLL :
Press this button while holding the IN and OUT buttons to move the tape to the preroll point of the input IN and OUT points. The preroll point is obtained by substracting the preroll time from the editing point (IN or OUT point). (The operation is possible even when the order in which the buttons are pressed is reversed.) The preroll time can be set to 3, 5 or 7 seconds by the preroll select switch in initial setting section.

PREVIEW :
Press this button to rehearse before real editing. The details of editing to be executed are simulated.

AUTO EDIT/END :
Press this button for automatic editing.
Also press the button to stop editing midway.

ALL STOP :
Press this button to stop all VCRs connected.
The VL-S100 enters the still play mode when this button is pressed in modes other than FF and REW.

AUDIO SPLIT :
(Has no effect when the VL-S100 is connected)
Press this button to input the audio IN points for audio split editing. This button may not operate depending on the VCRs connected.

REVIEW :
Press this button to check the edited scene.
The VCR plays the tape from 3 seconds before the IN point to 2 seconds after the OUT point.

— Initial Setting Section —

TC/RTC/CTL :
This switches the readings displayed by the time counter. Howerver, the VCR must be equipped with the function.

TC : Time code
RTC : Relative time code (counts the time code up or down)
CTL : CTL counter (set to CTL when shipped from the factory)

PREROLL :
Selects the preroll time from 7, 5 or 3 seconds (set to 7 seconds when shipped from the factory).

SYNCHRO :
Switches the adjustment mode (set to off with the VL-S100)

ON/CF : Adjusts the phase and color frame.
ON : Adjusts the phase, but not the color frame.
OFF : Does not adjust the phase.

CUE-X :
Sets the timing of CUE-X which is output at the switching point between players 1 and 2 in A/B roll editing. Turn the JOG dial of the recorder while holding this button depressed to set the timing from the preroll point to +59 seconds, 29 (24) frames. The set value is backed up when the power is turned off. (Set to 00 seconds, 00 frames when shipped from the factory)

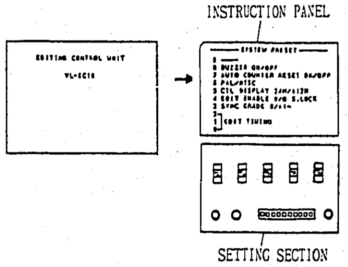


Fig. 1-16 Initial Setting Section

CUE-REC :

Sets the timing of the CUE-REC signal which is output at the REC-IN point of the recorder.

Turn the JOG dial while holding this button depressed to set the timing from the negative preroll point to +59 seconds, 29 (24) frames. The set value is backed up when the power is turned off.

SYSTEM PRESET :

No. 0-2 Edit timing :
000, 001, 010, 011, 100, 101, 101, 111
AUTO, -1, -2, -3, -4, -5, -6, -7

No. 3 Treatment of phase adjustment results :
OFF: Performs editing if the phase cannot be adjusted.
ON : Does not perform editing until a ±0 frame accuracy can be achieved.

No. 4 Servo lock :
OFF: Does not perform editing unless servo is locked.
ON : Performs editing even when servo is not locked.

No. 5 Switching of time range in RTC/CTL mode :
OFF: 00:00:00:00 - 23:59:59:29 (24)
ON : -4:00:00:00 - 19:59:59:29 (24)

No. 6 Type of VCR :
OFF: NTSC (30 frames /second)
ON : PAL (25 frames/second)

No. 7 Switching of automatic reset of counter :
OFF: Is not reset
ON : Is reset

No. 8 Buzzer sound does not sound at editing points :
OFF: Does not sound
ON : Sounds

No. 9 Auxiliary switch : OFF

LEARN :

Measures the time unitl the VCR starts play or recording in the still or pause mode and controls so that phase adjustment can be done in the minimum period.

The measured value is backed up when the power is turned off.

14. Connection Jacks (On Rear Panel)

AC IN :

Connect to a commercial power supply using the AC cable provided.

CUE-X :

Outputs a timing pulse to external equipment at the switching point betwen players 1 and 2 for A/B roll editing.

Sets the timing of the CUE-X signal.

Make-contact output: about 100ms, Contact capacitance: 35V, 100mA

CUE-REC :

Outputs a timing pulse at the EDIT IN point to control the external equipment.

Make-contact output: about 100ms, Contact capacitance: 35V, 100mA

REF VIDEO IN :

Receives a 1.0Vp-p reference sync video signal. (The input impedance is terminated with 15ohm.)

RECORDER :

Connect to the recorder VCR via the 9-pin cable provided.

PLAY 1 :

Connect to the player VCR via the 9-pin cable provided.

PLAY 2 (VL-EC20 only) :

Connect to a VCR via a 9-pin cable for A/B roll editing.

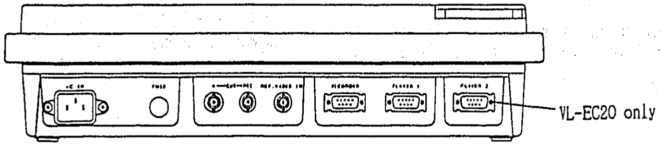


Fig. 1-17 Rear Panel

15. Editing

Preparation of editing :

(1) Checking the characteristics of the VCR (LEARN function)
- Set the SYSTEM RESET correctly.
- After all connections are completed, insert a recorded tape into the VCR and press the LEARN button. Measure the rise characteristic of the VCR.

(2) When using a blank tape
When using a blank tape for automatic editing, record CTL signals on the tape and then start editing.

Manual editing :

(1) Setting the edit mode : Press the ASSEMBLE button or INSERT button (V, A1, A2) to set the edit mode.
(2) Search the IN points of the recording and playback VCRs.
(3) Rewind the tapes in both VCRs to points several seconds before the IN points.
(4) Press the PLAY buttons of the recording and playback VCRs simultaneously.
(5) When the target IN points are reached, press the PLAY and EDIT buttons simultaneously.
(6) When the editing end (OUT) point is reached, press the PLAY button of the recording VCR or the EDIT START/END button.
(7) Press the REVIEW button to check the edited scene when required. After checking, press the AUTO EDIT/END button to release REVIEW.

Audio split editing :

This function shifts the video and audio IN points during insert editing. (*The VL-S100 does not have this function)

(1) Press the INSERT button (V, A1, A2).
(2) Determine the IN points of the recording VCR and playback VCR. (Video)
(3) Search the audio IN point and obtain a still picture.
(4) Press the AUDIO SPLIT button. (The lamp lights) Press the ENTRY button while holding the IN button of the recording or playback VCR depressed to input the audio IN point.
(5) Determine the OUT points of the recording and playback VCRs.
(6) Press the AUTO EDIT/END button; split editing starts. After editing is completed, the audio IN point is reset.

Continuous editing (BUT EDIT) :

Set the edit end (OUT) point to the next edit start (IN) point to perform editing continuously.

(1) Determine the IN point of the playback VCR.
(2) Press the AUTO EDIT/END button. (Editing starts)
(3) Press the AUTO EDIT/END button to end editing. (This point where the button is pressed is set to the IN point of the next edit.)

Single editing :

Use this function to record the input from external equipment onto the recording VCR.

(1) Determine the IN point (and OUT point) of the recording VCR.
(2) Press the AUTO EDIT/END button.
When the OUT point has not been input, press the AUTO EDIT/END button again at the point where editing is to end.

Automatic editing :

(1) Press the ASSEMBLE button or INSERT button (V, A1, A2) to set the editing mode.
(2) Setting the IN and OUT points
Press the JOG/SHUTTLE dial to set to the SHUTTLE mode. Turn the dial to feed the tape to the required scene.
Near the required scene, press the JOG/SHUTTLE dial to set to the JOG mode and turn the dial to feed the tape exactly to the required scene. When the required scene is reached, press the ENTRY button whiel holding the IN (OUT) button depressed. (If the OUT point is before the IN point, the buzzer sounds.)
Checking before editing (check as required)
    (i) Checking the edit points : Check by pressing the IN/OUT buttons.
    (ii) Pictures at the edit points : Press the GOTO button while holding the IN/OUT buttons depressed.
    (iii) Resetting the edit points : When the RESET button is pressed, both the IN and OUT points of the VCR for which the RESET button is pressed are reset. When resetting the IN or OUT point, press the RESET button while holding the IN or OUT button depressed.
    (iv) Previous edit points : Press the LAST EDIT button.
(3) Execution of editing (EDIT)
Press the AUTO EDIT/END button to start editing. When editing starts, the indicators of the buttons light to signal the operation status. When editing ends, the edit points are reset. (When an abnormality occurs, the buzzer sounds and an error number is displayed.)

Rehearsal of editing (PREVIEW) :

(1) Determine the editing mode (assemble or insert editing).
(2) Set the IN and OUT points of the recording VCR. (You may set the OUT point of either the playback or recording VCR.)
(3) Press the PREVIEW button.
When preview is performed, the indicators in the buttons light to signal the operation status and the VCRs perform the preview editing of the tape. The video (audio) between the IN and OUT points is set to the state which was selected in the edit mode. (The picture and A1 and A2 sounds are input in assemble editing.)

Correcting the editing points (trimming function) :

Press the + and - buttons while holding the button corresponding to the editing point (IN, OUT points) to be corrected.

+ button (advances the tape by one frame)
- button (reverses the tape by oen frame)

Checking the edited scenes (PREVIEW) :

Press the REVIEW button to check the edited scenes. The indicator in the button lights to display the operation state. The VCR plays the tape from the preroll point to 2 seconds after the editing end point. The recording VCR plays the tape until 2 seconds after the OUT point and rewinds it to the OUT point.

Stopping automatic editing :

Press the ALL STOP or AUTO EDIT/END button to stop REVIEW, EDIT or PREVIEW editing midway.

When the ALL STOP button is pressed, the VCRs enter the still play modes immediately. When the AUTO EDIT/END button is pressed during editing, the point where the button is pressed is set as the OUT point and the VCRs enter the still play modes after editing is completed. (Assemble editing is ended about 2 seconds after the button is pressed. The button operates in the same way as the ALL STOP Button in other edit modes.)

The point where the button is pressed is registered as the OUT point.

16. Editing Chart

To determine the ediiting points :

Input of IN points	Press IN while holding ENTRY depressed.*
Input of OUT points	Press OUT while holding ENTRY depressed.*
Change of IN points	Press + or - while holding IN depressed.
Change of OUT points	Press + or - while holding OUT depressed.

After determining the editing points :

To move the tape to the IN point.	Press GOTO while holding IN depressed.*
To move the tape to the OUT point.	Press GOTO while holding OUT depressed.*
To move the tape to the preroll point of the IN point.	Press PREROLL while holding IN depressed.*
To move the tape to the preroll point of the OUT point.	Press PREROLL while holding OUT depressed.*
Checking before editing	Press PREVIEW.
Real editing	Press AUTO EDIT/END.
Checking after editing	Perform REVIEW.
Stop real editing.	Press AUTO EDIT/END (the point where editing is stopped becomes the OUT point).

To determine the new editing points after editing is ended :

Checking the last editing points	Press LAST EDIT.
Return to the new editing points from LAST EDIT.	Press LAST X.

The operations marked * can be done if the buttons are pressed in the reverse order.

CHAPTER 2

DISASSEMBLY

1. LOCATIONS OF CIRCUIT BOARDS

IPP : Connected to the cylinder
PBK : Power backup
VID : Recording signal process
ENC : Playback signal process(encoding digital signals)
DIG : Baseband signal(R-Y/B-Y/Y) digital process
MAS : System control, servo, audio
DMD : Drum motor/reel motor drive
LCD : LCD counter
REM : RS-422 transmitter/receiver
FSW : Front switch input, μP
REG : 5V regulator
SBD : Connected to internal battery
SC : Playback chroma phase adjustment
SWA : Connected to function switches
SWB : Connected to function switches
BUK : Backlight for the LCD

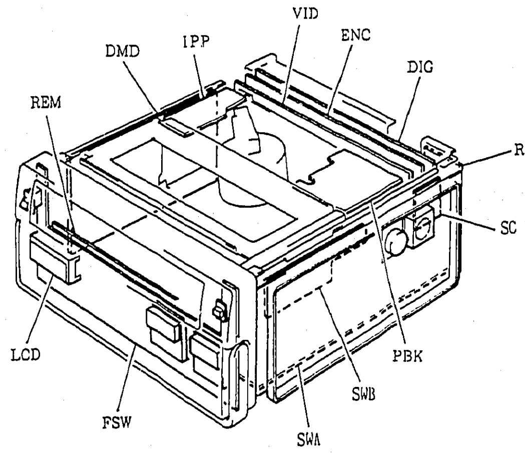


Fig. 2-1 Locations of Circuit Boards (Top View)

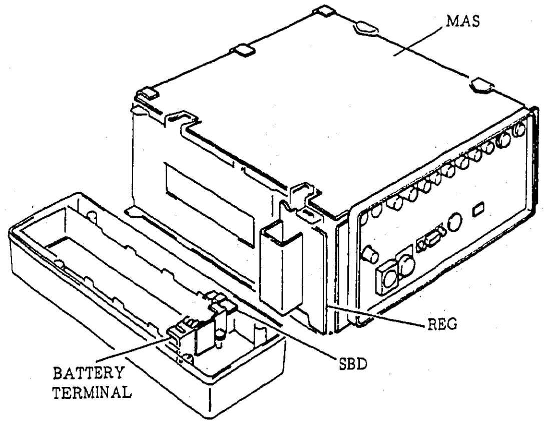


Fig.2-2 Locations of Circuit Boards (Bottom View)

2. CASE REMOVAL

2-1. Handle (Fig. 2-1)

1) Remove two (2) screws using a coin or a flat bladed screwdriver.
Two (2) nylon washers are provided for the handle and screws on the left and right. When reinstalling the handle, attach the washers correctly, not confusing their directions.

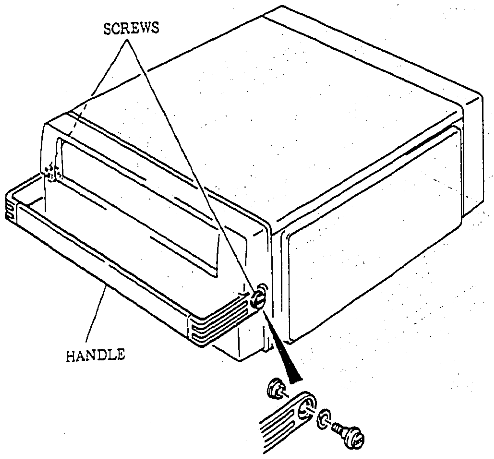


Fig. 2-1 Handle

2-2. Top Cover (Fig. 2-2)

1) Remove four (4) screws.
2) Lift the rear of the cover and then remove the entire cover.

When reinstalling, fit the front of the cover first.

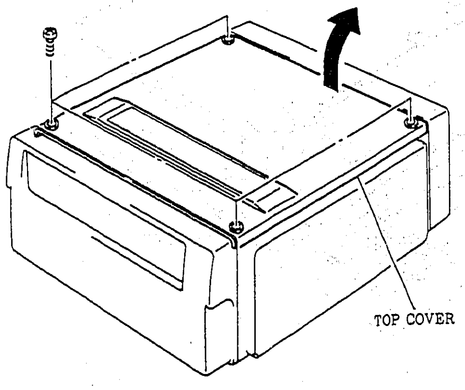


Fig. 2-2 Top Cover

2-3. Side Cover (L) (Fig. 2-3)

1) Remove four (4) screws and one (1) screw.

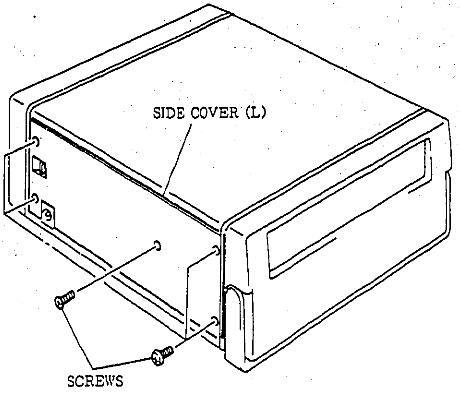


Fig. 2-3 Side Cover (L)

2-4. Bottom Cover (Fig. 2-4)

1) Remove four (4) screws.
2) Lift up the rear of the cover and pull both sides of the cover outwards, then remove the front of the cover.

When reinstalling, fit the front of the cover into the front panel and then push the rear of the cover.

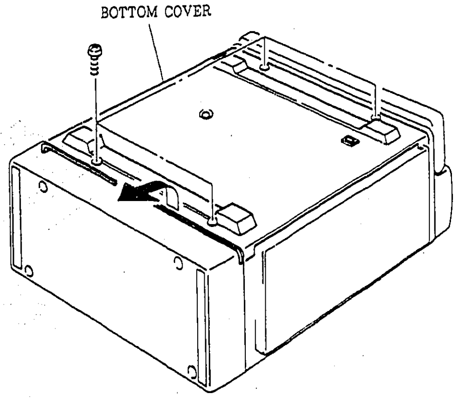


Fig. 2-4 Bottom Cover

2-5. Front Panel (Fig. 2-5)

The front panel is tightened together with the adjacent covers.
When removing only the front panel, remove eight (8) screws around the front panel; the front panel can be pulled out.

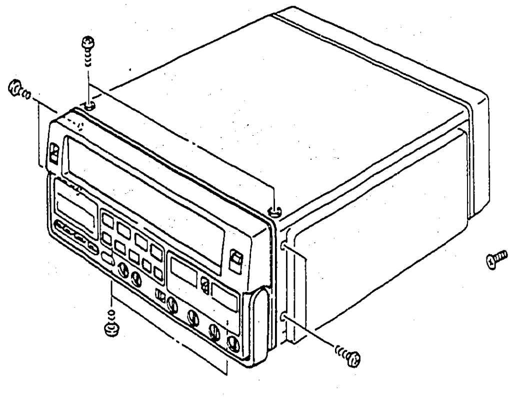


Fig. 2-5A Front Panel

Normally, remove the front panel by the following precedure.

1) Remove the top and bottom covers. (The front panel is partially tightened together with the top and bottom covers.)
2) Remove two (2) screws at the front of side cover (L).
3) Remove two (2) screws at the front of the jack panel.
4) Hold the top and bottom of the front panel on the left and right, and while moving the panel up and down, pull it out form the unit.

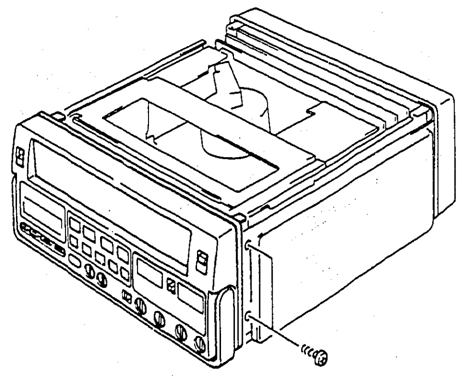


Fig. 2-5B Front Panel

2-6. Rear Cover (Fig. 2-6)

1) Remove six (6) screws.

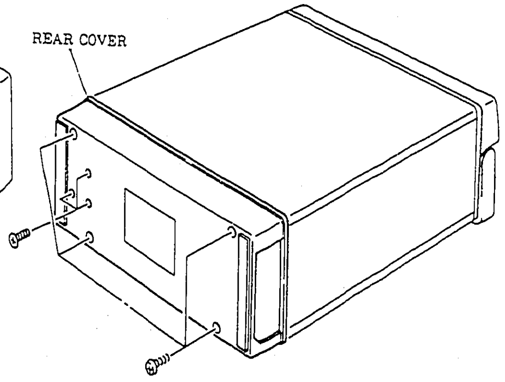


Fig. 2-6 Rear Cover

3. CIRCUIT BOARD REMOVAL

Relationship between covers and circuit boards

Top cover ———IPP, PBK, VID, ENC, DIG
Bottom cover —— MAS
Side cover (L) — DMD
Front panel —— LCD, REM, FSW
Rear cover —— REG, SBD, Battery terminal plate

3-1. VID, ENC and DIG Circuit Boards (Fig. 3-1)

1) Remove the top cover.
2) Hold the left and right sides of each circuit board and pull out the board from the chassis.

When connecting the circuit board, lower the board along the specified guides. When the board stops, apply force to the top of the board evenly on the left and right to connect the circuit board.

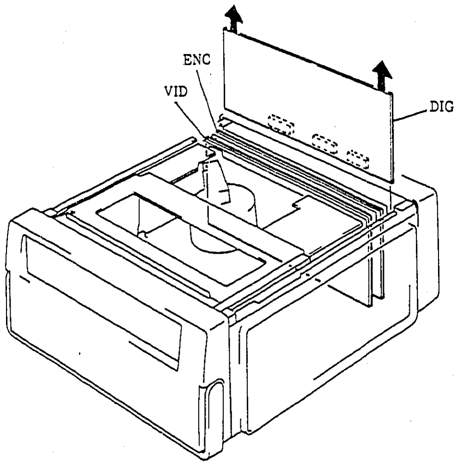


Fig. 3-1 VID,ENC and DIG Circuit Boards

3-2. IPP Circuit Board (Fig. 3-2)

1) Remove the top cover.
2) Remove one (1) screw.
3) The rear of the circuit board is held by the frame. Remove the circuit board while taking care of it.

3-3. PBK Circuit Board (Fig. 3-2)

1) Remove the top cover.
2) Remove one (1) screw.
3) The rear of the circuit board is held by the frame. Remove the circuit board while taking care of it.

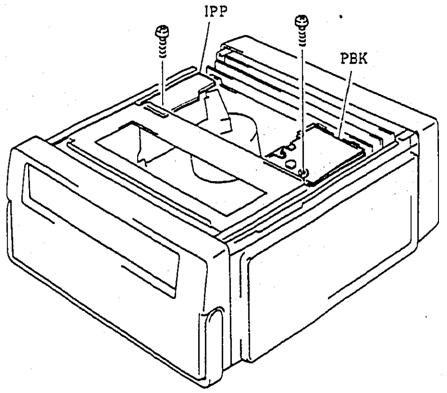


Fig. 3-2 IPP and PBK Circuit Boards

3-4. DMD Circuit Board (Fig. 3-3)

1) Remove side cover (L).
2) Remove two (2) screws.

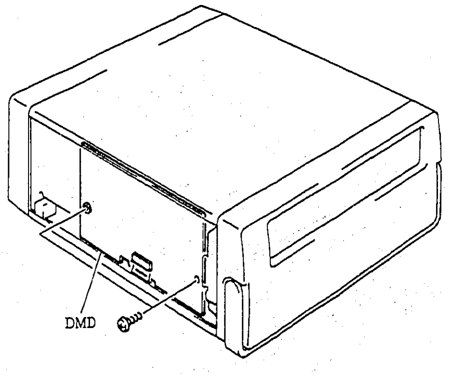


Fig. 3-3 DMD Circuit Board

3-5. REM Circuit Board (Fig. 3-4)

1) Remove the front panel.
2) Remove three (3) screws.
3) The top of the REM circuit board is connected to the FSW circuit board via three (3) connectors. Disconnect them while taking care so as not to break them.

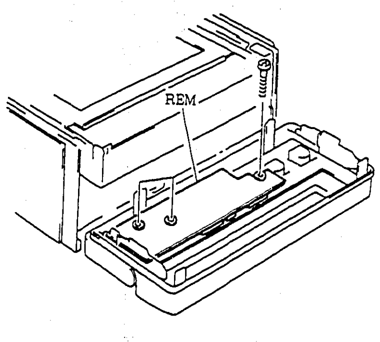


Fig. 3-4 REM Circuit Board

3-6. FSW Circuit Board (Fig. 3-5)

1) Remove the front panel.
2) Remove the REM circuit board.
3) Remove three (3) screws.

When reinstalling, check that there are no knobs, etc. missing or parts inserted incorrectly and then tighten the circuit board with the screw.

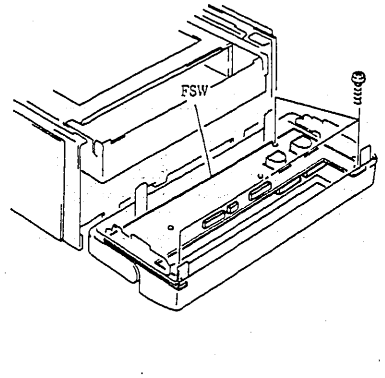


Fig. 3-5 FSW Circuit Board

3-7. LCD Circuit Board (Fig. 3-6)

1) Remove the front panel, REM and FSW circuit boards.
2) Release four (4) tabs (corners) on the LCD holder fixed to the FSW circuit board and remove the LCD holder.

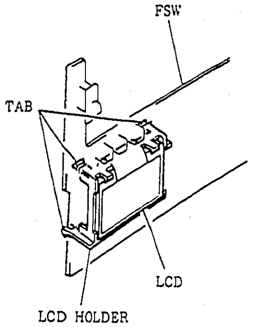


Fig. 3-6 LCD Circuit Board

3-8. REG Circuit Board (Fig. 3-7)

1) Remove the rear cover.
2) Push the tab holding the circuit board holder upward and release the top of the circuit board. Taking care not to break the board, release the bottom of the board from the bracket.

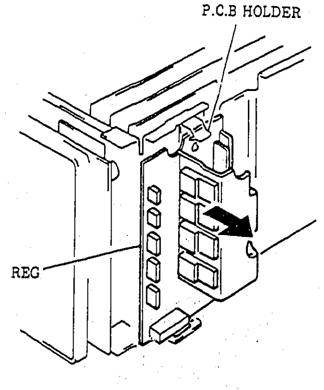


Fig. 3-7 REG Circuit Board

3-9. Battery Terminal (Fig. 3-8)
1) Remove the rear cover.
2) Remove one (1) screw.

3-10. SBD Circuit Board
1) Remove the rear cover.
2) Remove one (1) screw.

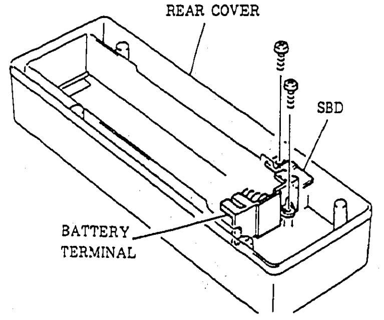

REAR COVER
SBD
BATTERY TERMINAL

Fig. 3-8 Battery Terminal and SBD Circuit Board

3-11. MAS Circuit Board (Fig. 3-9)
1) Remove the top cover and pull out the VID, ENC and DIG circuit boards which are inserted into the slots in the MAS circuit board.
2) Remove the bottom cover.
3) Remove the front panel.
4) Remove the rear cover and then the REG circuit board.
5) Disconnect the connector between the REG and PBK circuit boards.
6) Remove the PBK circuit board.
7) Remove two (2) screws.
8) Open the MAS circuit board together with the jack plate.

When reinstalling, connect the connector securely.

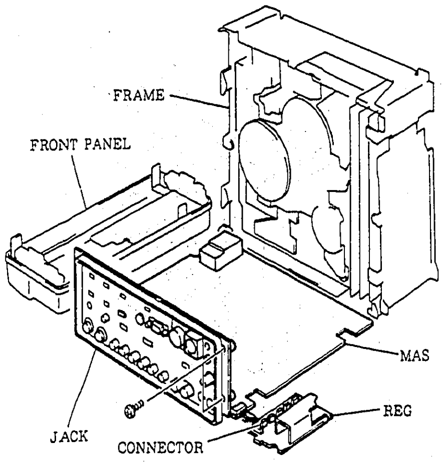

FRAME
FRONT PANEL
MAS
REG
JACK
CONNECTOR

Fig. 3-9 MAS Circuit Board

3-12. Jack Plate (Fig.3-10)
1) Open the jack plate together with the MAS circuit board.
2) Remove five (5) screws.
3) Unsolder the terminals of each jack soldered to the MAS circuit board.

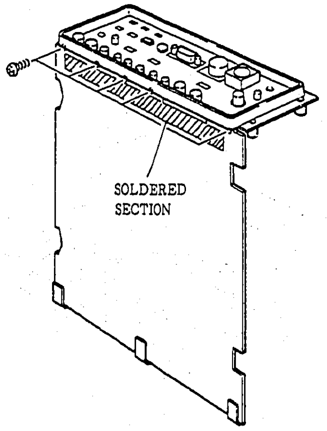

SOLDERED SECTION

Fig. 3-10 Jack Plate

3-13. SWA Circuit Board (Fig. 3-11)
1) Open the MAS circuit board.
2) Loosen the nut holding the SOURCE OUT jack and remove the jack from the jack plate.
3) Remove three (3) screws.

3-14. SWB Circuit Board (Fig. 3-11)
1) Open the MAS circuit board.
2) Remove five (5) screws.

3-15. SC Circuit Board (Fig. 3-11)
1) Open the MAS circuit board.
2) Remove two (2) screws.

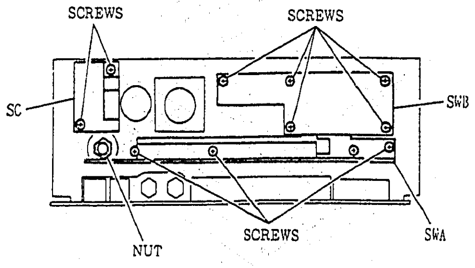

SCREWS
SCREWS
SC
SWB
NUT
SCREWS
SWA

Fig. 3-11 SWA,SWB and SC Cricuit Boards

4. NAMES AND LOCATIONS OF MAIN MECHANICAL COMPONENTS

1. Chassis Holder
2. Cassette Holder
3. Gear Bracket
4. Switch Lever (B)
5. FL Worm Gear
6. Switch Lever (A)
7. Worm Wheel
8. Drive Gear
9. Door Arm
10. Front Holder
11. Synchro Shaft
12. Side Chassis

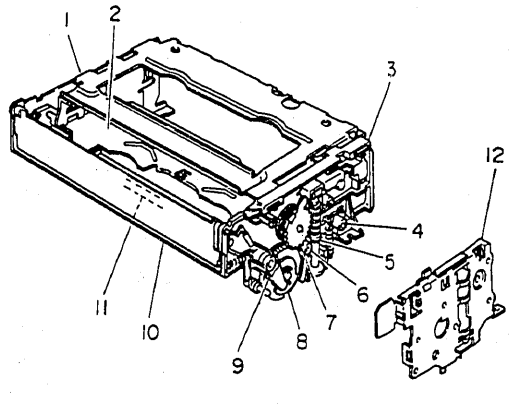

1
2
3
12
4
5
6
7
8
9
10
11

Fig. 4-1 Cassette Loading Mechanism

1. Safety Arm
2. Tension Band
3. Tension Arm
4. Supply Reel Sensor
5. Supply Guide Roller
6. Supply guide Pole
7. Full Erase Head
8. Inclined Guides
9. Impedance Roller
10. Cylinder Cover
11. Ground Brush
12. Pre Amp P.C.B
13. Take-up Guide Roller
14. Cylinder Motor
15. Cylinder Motor Base
16. Audio/Control Head
17. Take-up Guide Pole
18. Capstan Shaft
19. Dew Sensor
20. Pressure Roller
21. Mechanism State Switch
22. Loading Motor
23. Loading Motor Holder
24. Load Bracket Assembly
25. Cassette Lid Opener
26. Take-up Reel Sensor

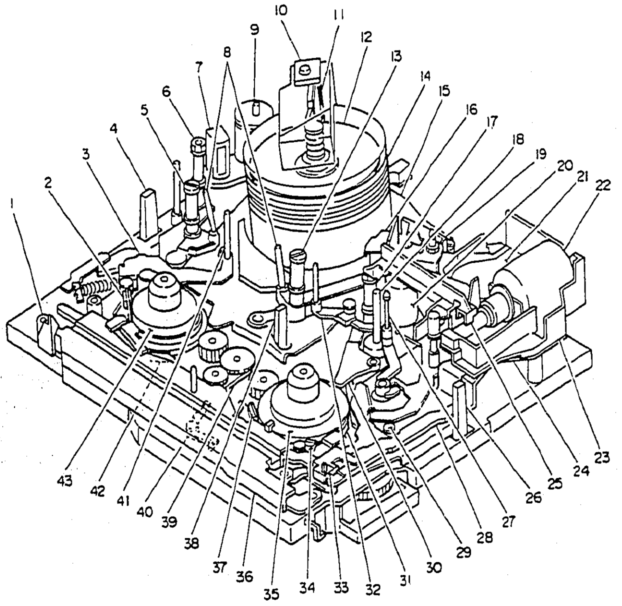

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43

Fig. 4-2 Top View of Mechanism

27. Draw Arm
28. Brake Link Arm
29. Pressure Roller Operation Arm
30. Relay Arm
31. Take-up Brake
32. Half Loading Arm
33. S-VHS Detection Switch
34. Sub-B Arm
35. Take-up Reel Disk
36. Slider Block
37. Take-up Main Brake
38. End Lamp
39. Reel Drive Idler
40. Inhibit Arm
41. Tension Pole
42. Supply Main Brake
43. Supply Reel Disk
44. Gear Base Assembly
45. MWB (Sensor/Motor Drive) P.C.B
46. Capstan Flywheel
47. Capstan Motor P.C.B
48. Cylinder Motor
49. Supply Loading Gear
50. Sensor P.C.B
51. Take-up Loading Gear
52. Reel Motor P.C.B
53. Reel Motor

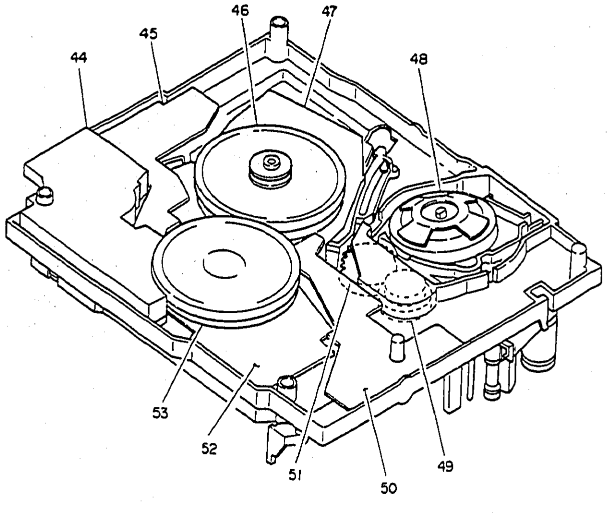

44
45
46
47
48
53
52
51
50
49

Fig. 4-3 Bottom View of Mechanism

55. Change Arm
56. Change Gear
57. Relay Gear 1
58. Relay Gear 2
59. Relay Gear 3

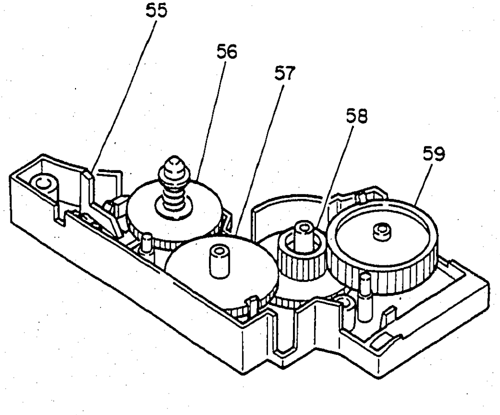

55
56
57
58
59

Fig. 4-4 Gear Base

5. CASSETTE LOADING MECHANISM REMOVAL

*Removal of the following components is described as if the side covers, top and bottom covers, front panel, rear cover and the cassette loading mechanism have already been removed. (See items 2-1~2-6 in the section on case removal.)

5-1. Cassette Loading Mechanism
5-2. Loading Gear Assembly, Chassis Holder, Cassette Holder Assembly and Front Holder
5-3. Cassette Holder Base and Cassette Holders (L/R)

5-1. Cassette Loading Mechanism (Fig. 5-1)

1) Remove the IPP and PBK circuit boards.
2) Remove two (2) screws.
3) Lift up the rear of the mechanism and release two (2) engaged sections and the front bottom.

When reinstalling, engage two (2) sections at the front bottom and check that the mechanism fits stably, then tighten the screws.

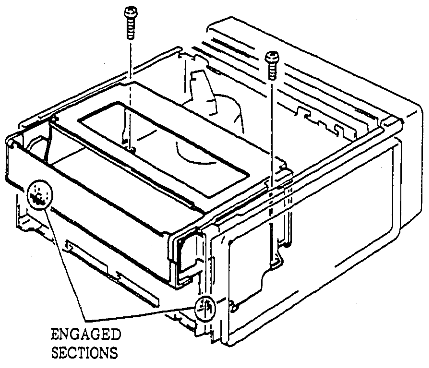

ENGAGED SECTIONS

Fig. 5-1 Cassette Loading Mechanism

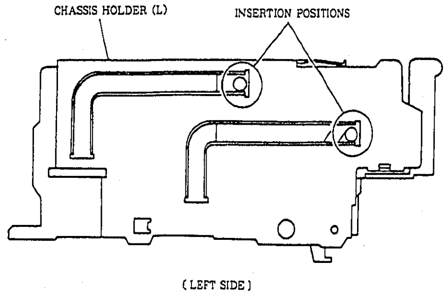

CHASSIS HOLDER (L)
INSERTION POSITIONS
[LEFT SIDE]

Fig. 5-2-2 Cassette Loading Mechanism

5-2. Loading Gear Assembly, Chassis Holder, Cassette Holder Assembly and Front Holder

⟨Loading Gear Assembly⟩(Fig. 5-2)
1) Release two (2) tabs at the section engaged with the chassis holder and one (1) section linked with the front holder.

⟨Chassis Holder⟩(Fig. 5-2)
2) Release two (2) tabs engaging the chassis holder and front holder.

⟨Cassette Holder Assembly⟩(Fig. 5-2)
3) Open the drive arm in the direction of the arrow and remove the cassette holder assembly.

⟨Front Holder⟩(Fig. 5-2)
4) Remove the shaft pin and drive arm.

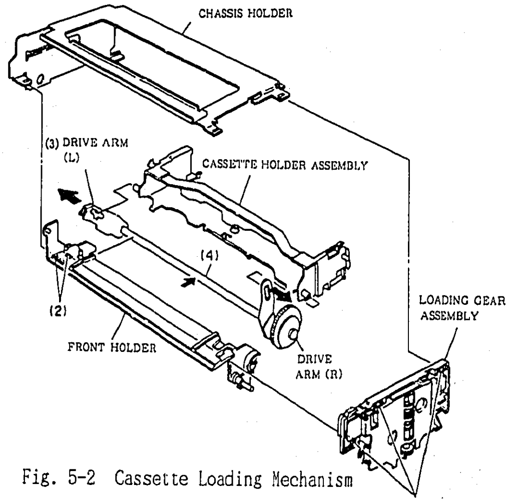

CHASSIS HOLDER
(3) DRIVE ARM (L)
CASSETTE HOLDER ASSEMBLY
(4)
(2)
FRONT HOLDER
DRIVE ARM (R)
LOADING GEAR ASSEMBLY
(1)

Fig. 5-2 Cassette Loading Mechanism

[Cautions when reinstalling]
Reinstall each component by the reverse procedure to removal, taking care of the following.

*Insert two (2) bosses of the cassette holder into the groove on the left of the chassis holder.
*Insert two (2) bosses of the cassette holder into the groove on the right of the chassis holder when reinstalling the loading gear assembly.

*Align marking (△) on the synchro gear and marking (◇) on the clutch gear.
*Set the boss of cassette switch lever (A) to the cam section of the synchro gear.

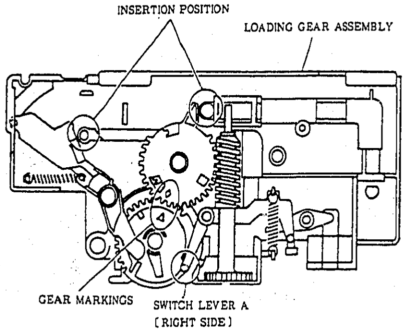

INSERTION POSITION
LOADING GEAR ASSEMBLY
GEAR MARKINGS
SWITCH LEVER A
[RIGHT SIDE]

Fig. 5-2-3 Cassette loading Mechanism

5-3. Cassette Holder Base and Cassette Holders (L/R) (Fig. 5-3)

1) Release four (4) tabs on cassette holders L/R and remove the holder base.
2) Release the tabs of the left and right cassette holders and pull out holders.

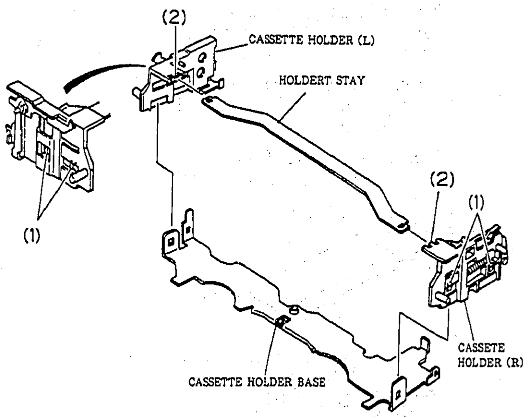

(2)
CASSETTE HOLDER (L)
HOLDERT STAY
(2)
(1)
(1)
CASSETTE HOLDER (R)
CASSETTE HOLDER BASE

Fig. 5-3 Cassette Holder

5-4. Loading Gear (Fig. 5-4)

(Side chassis)

1) Release four (4) tabs which engage the loading gear assembly and side chassis and remove the side chassis.
2) Pull out the FL worm gear.
3) Pull out the door arm.
4) Pull out the worm wheel.
5) Remove the spring between the switch lever (A) and gear bracket.
6) Pull out switch levers (A, B).

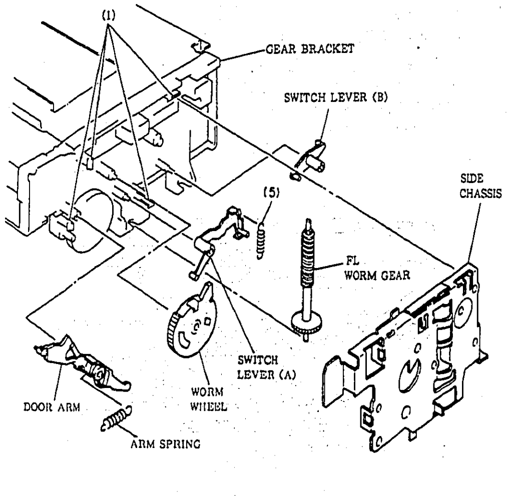

(1)
GEAR BRACKET
SWITCH LEVER (B)
SIDE CHASSIS
(5)
FL WORM GEAR
SWITCH LEVER (A)
WORM WHEEL
DOOR ARM
ARM SPRING

Fig. 5-4 Loading Gear

6. MAIN MECHANICAL COMPONENTS REMOVAL

Heads

1. Impedance Roller/FE (Full Erase) Head, A/C (Audio/Control) Head
2. Upper Cylinder (Video Heads)

Motor and Sensors

3. Cylinder Motor Assembly
4. Capstan Motor Assembly
5. Loading Motor/Mechanism State Switch Assembly
6. Reel Motor Assembly

Miscellaneous

7. Tension Arm and Tension Band
8. Slider Block and Reel Drive Idler
9. Supply/Take-up Reel Disks, S-VHS Switch/Half Loading Arm and Relay Arm
10. Rollers and Guides
    - Pressure Roller
    - Supply Guide Pole
    - Take-up Guide Pole
    - Supply/Take-up Guide Rollers
11. Loading Motor Assembly, Brake Link Arm and FS Brake Arm
12. Load Bracket Assembly and Take-up Brake
13. Brake Operation Arm, Mode Gear, Worm Wheel, Pressure Roller Operation Arm, Mode Change Arm and Brake Lift Arm
14. Cylinder Motor Base and Supply/Take-up Loading Arms
15. Gear Base Assembly
16. Change Arm, Change Gear and Relay Gear

6-1. Heads

(Impedance Roller/FE (Full Erase) Head) (Fig. 6-1)

1) Remove the top cover and IPP circuit board and side covers. (See item 2-2 in the section on case removal)
2) Remove the spring between the FE head base and chassis.
3) Disconnect the connector.
4) Remove the nut holding the guide pole and pull out the guide pole.
5) Release one (1) tab and remove the impedance roller/FE head.
6) To separate the FE head, release two (2) tabs and pull out the head.

(A/C (Audio/Control) Head) (Fig. 6-1)

7) Disconnect the connector.
8) Remove the nut holding the head base and pull the base up and out.

*Hook the bottom of the spring, located under the head base, to the chassis, and the top to the stopper of the head base.

[Cautions when reinstalling]

*Check that the spring section of the A/C head retaining screw protrudes over the top surface of head base (1).
*Check that head bases (1) and (2) are parallel.

[Adjustments after reinstallation]

A/C Head Adjustment
X-Value Adjustment
Audio Playback Level Adjustment
Audio Bias Level Adjustment

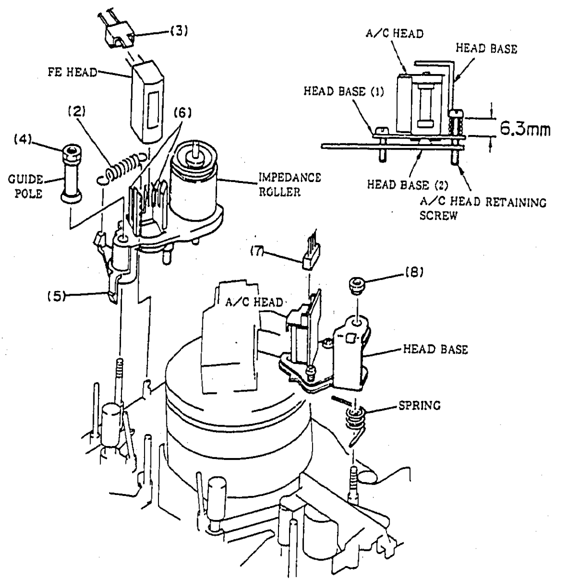

(3)
FE HEAD
(2)
(6)
(4)
GUIDE POLE
IMPEDANCE ROLLER
(5)
(7)
(8)
A/C HEAD
HEAD BASE
SPRING
A/C HEAD
HEAD BASE
HEAD BASE (1)
6.3mm
HEAD BASE (2)
A/C HEAD RETAINING SCREW

Fig. 6-1 Heads

6-2. Cylinder Motor Assembly (Fig. 6-2)

1) Remove the rear battery box, front panel and top cover. (See items 2-2 and 2-5 in the section on case removal)
2) Remove two (2) screws on the rear of the right side panel.

(Bottom view)

3) Remove the bottom cover. (See item 2-4 in the section on case removal)
4) Remove two (2) screws holding the main circuit board.
5) Remove three (3) video circuit boards (VID, ENC, DIG) and three (3) insulator sheets.
6) Remove the REG circuit board.
7) Lift the main circuit board from the side so the bottom can be seen.
*The wires of the REG circuit board are laid out on the frame, therefore, release the wires before lifting the main circuit board.
8) Disconnect the connector from the cylinder motor circuit board.
9) Remove three (3) screws holding the cylinder.

(Top view)

10) Remove the IPP circuit board and disconnect the preamp connector.
11) Pull out the cylinder motor assembly upwards.

[Cautions during work]

*Set the side of the unit down since the retaining screws are in the reverse side to that from which the cylinder motor assembly is removed.
*Do not touch the video head tips with your fingers or a tool.

[Adjustments after reinstallation]

Adjustment after replacing the cylinder

6-3. Capstan Motor Assembly (Fig. 6-3)

1) Remove the bottom cover. (See item 2-4 in the section on case removal)
2) Remove two (2) screws holding the main circuit board.
3) Remove three (3) video circuit boards (VID, ENC, DIG) and three (3) insulator sheets.
4) Remove the REG circuit board.
5) Lift the main circuit board from the side so the bottom can be seen.
*The wires of the REG circuit board are laid out on the frame, therefore, release the wires before lifting the main circuit board.
6) Remove three (3) screws and the motor cover.

*Since the wires are laid out on the motor cover, release them before removing the motor cover.
7) Disconnect two (2) connectors.
8) Remove three (3) screws and pull out the capstan motor assembly.
*Keep the capstan shaft clean when detaching and attaching the capstan motor assembly.

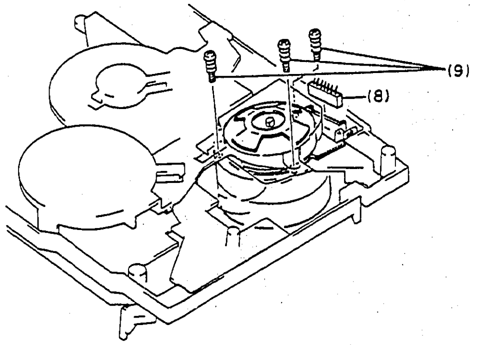


Fig. 6-2 Cylinder Motor

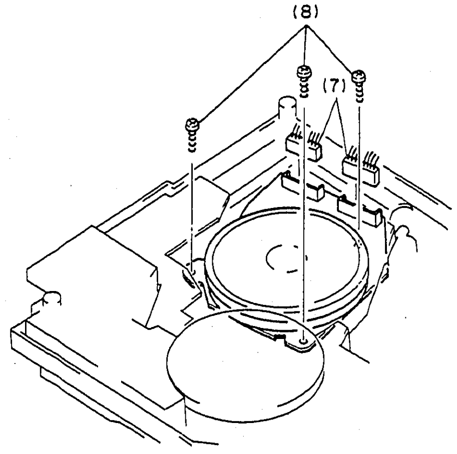


Fig. 6-3 Capstan Motor Circuit Board

6-4. Reel Motor Assembly (Fig. 6-4)

1) Remove the bottom cover. (See item 2-4 in the section on case removal)
2) Remove two (2) screwsw holding the main circuit board.
3) Remove three (3) video circuit boards (VID, ENC, DIG) and three (3) insulator sheets.
4) Remove the REG circuit board.
5) Lift the main circuit board from the side so the bottom can be seen.
*The wires of the REG circuit board are laid out on the frame, therefore, release the wires before lifting the main circuit board.
6) Remove three (3) screws and the motor cover.

*Since the wires are laid out on the motor cover, release them before removing the motor cover.
7) Remove two (2) washers in sequence and remove the reel drive idler.
8) Remove three (3) screws and the reel motor assembly.

6-5. Loading Motor/Mechanism State Switch Assembly and Dew Sensor

(Loading Motor Assmbly) (Fig. 6-5)

1) Remove the side panels and top cover. (See items 2-2 and 2-3 in the section on case removal.)
2) Release one (1) tab and remove the cassette lid opener.
3) Disconnect the connector.
4) Release two (2) tabs holding the mechanism state switch.
5) Release four (4) tabs, and while releasing two (2) bosses of the motor holder inserted into the screw holes in the motor, lift up the loading motor/mechanism state switch.

(Dew Sensor) (Fig. 6-5)

1) Remove one (1) screw.
2) Disconnect the connector.

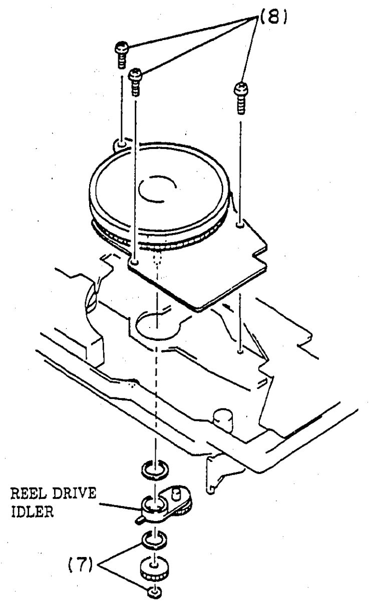


Fig. 6-4 Reel Motor Assembly

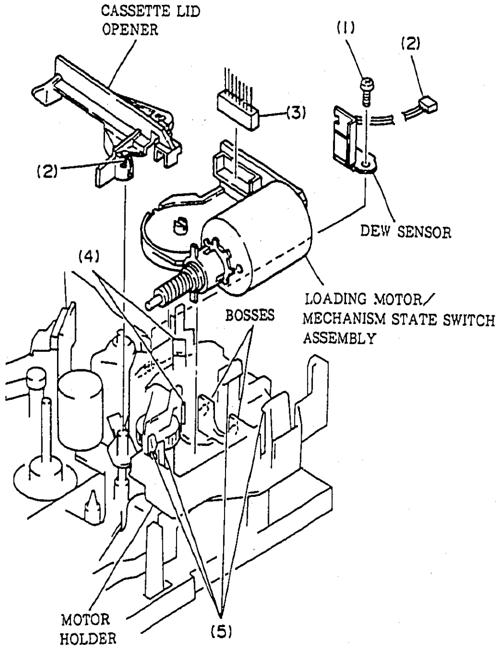


Fig. 6-5 Loading Motor Assembly

**Removal of components in items 6-6 to 6-15 is described as if the side panels, top and bottom covers, front panel and the cassette loading mechanism have been removed. (See items 2-2 to 2-6 in the sections on case removal and item 5-1 in the section on cassette loading mechanism removal.)*

6-6. Tension Arm/Tension Band Assembly (Fig. 6-6)

1) Remove the spring between the tension arm and spring holder.
2) Remove one (1) screw and the spring holder.
3) Move the supply subbrake in the direction of the arrow and remove the tension arm and tension band.

6-7. Slider Block (Fig. 6-7)

1) Remove two (2) screws.

[Cautions when reinstalling]
*Push the supply subbrake and the supply and take-up main brakes in the direction of arrows (A) to reinstall the slider block. Check that the position of the inhibit arm is correct; otherwise, the slider block cannot be installed.
*Check that the bosses of the load bracket assembly are inserted into each slider.
*Reinstall the inhibit arm while pushing the reel drive idler to the take-up side.

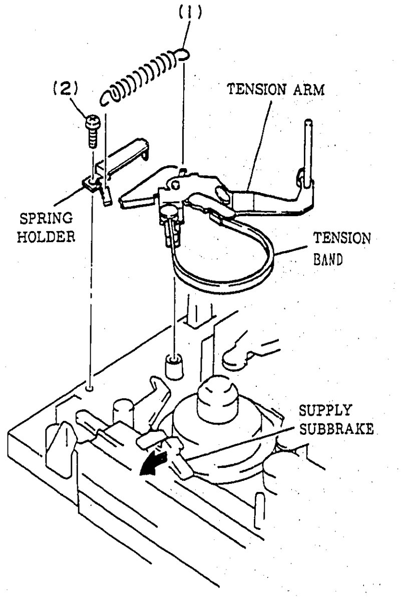


Fig. 6-6 Tension Arm

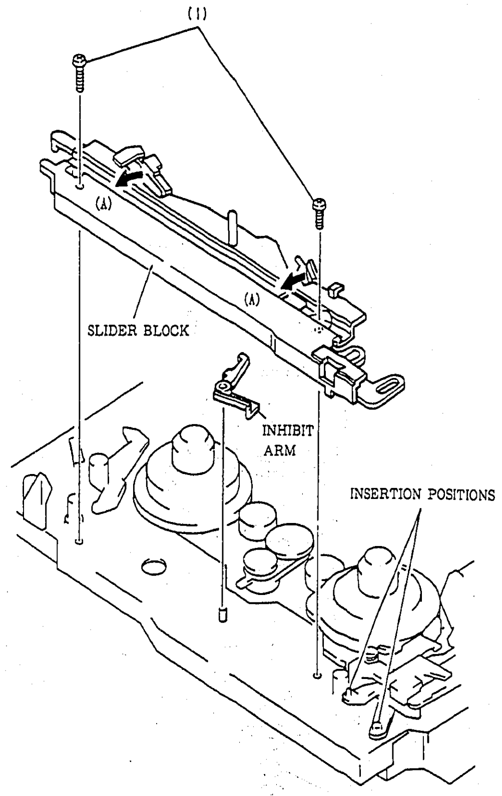


Fig. 6-7 Slider Block

6-8. Supply/Take-up Reel Disks, S-VHS Detection Switch, Half Loading Arm and Relay Arm

(Supply Reel Disk) (Fig. 6-8)
1) Remove the slider block. (See item 6-7)
2) Remove the tension arm and tension band. (See item 6-6)
3) Pull out the supply reel disk.

[Cautions when reinstalling]
*Check that a wasehr is threaded on the reel disk installation shaft.

[Adjustments after reinstalling]
Tension Pole Position and Tension Adjustments
Reel Disk Height Adjustment

(Take-up Reel Disk) (Fig. 6-8)
4) Pull out the take-up reel disk.

[Cautions when reinstalling]
*Check that a washer is threaded on the reel disk installation shaft.

[Adjustments after reinstalling]
Reel Disk Height Adjustment

(S-VHS Detection Switch) (Fig. 6-8)
5) Remove two (2) screws and pull up the switch.

[Cautions when reinstalling]
*Insert the pin plug into the connector of the MWB (sensor/motor drive) circuit board firmly.

(Half Loading Arm) (Fig. 6-8)
6) Remove the washer and pull out the arm upwards.
*Hook the bottom of the spring, located under the half loading arm, to the take-up guide pole, and the top to the stopper of the half loading arm.

(Relay Arm) (Fig. 6-8)
7) Remove the washer and the relay arm.

[Cautions when reinstalling]
*Check that the pin of the pressure roller operation arm is inserted into the groove in the relay arm.

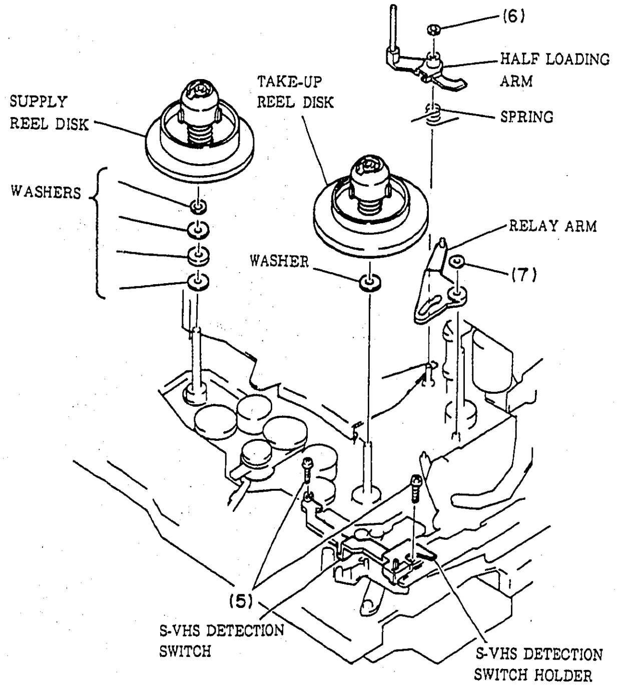


Fig. 6-8 *Reel Disk, etc.*

6-9. Rollers and Guides

(Pressure Roller Assembly) (Fig. 6-9)
1) Release one (1) tab and remove the cassette lid opener.
2) Pull out the pressure roller assembly.

[Cautions when reinstalling]
＊Check that the pin of the pressure roller is inserted into the hole in the pressure roller operation arm.
＊Clean the surface of the pressure roller which contacts the tape.

(Draw Arm) (Fig. 6-9)
3) Release one (1) tab and pull out the guide pin upward.

(Supply Guide Pole) (Fig. 6-9)
4) Loosen the guide pole retaining screw and pull out the pole.

[Cautions when reinstalling]
＊Clean the surface of the guide pole which contacts the tape.

[Adjustment after reinstalling]
＊Guide Pole Height Adjustment

(Take-up Guide Pole) (Fig. 6-9)
5) Loosen the guide pole retaining screw and pull out of the pole.

[Cautions when reinstalling]
＊Clean the surface of the guide pole which contacts the tape.

[Adjustment after reinstalling]
＊Guide Pole Height Adjustment

(Supply/Take-up Guide Rollers) (Fig. 6-9)
＊Remove the supply and take-up guide rollers in the same way.
6) Loosen the hexagonal screw holding the guide roller.
7) Turn the guide roller counterclockwise to pull it out.

[Adjustment after reinstalling]
＊Guide Roller Height Adjustment

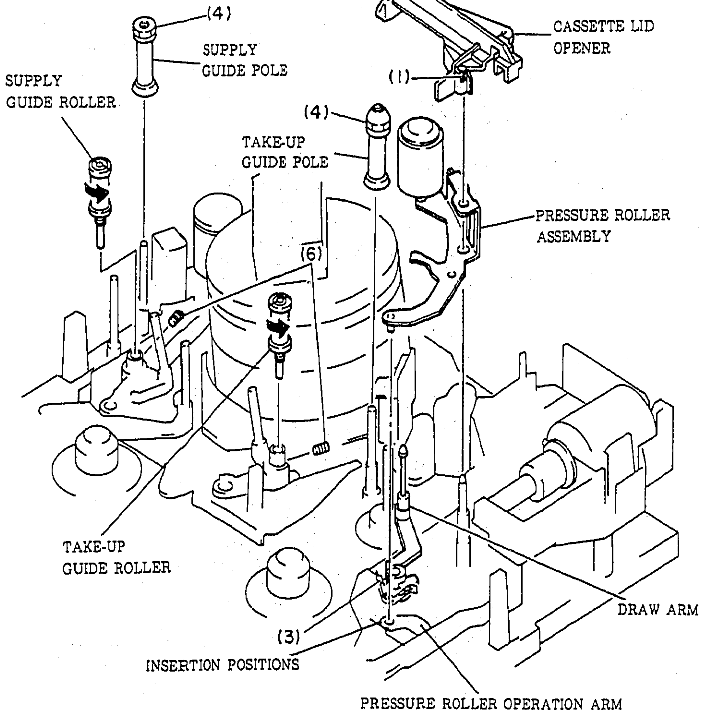

(4)
SUPPLY GUIDE POLE
SUPPLY GUIDE ROLLER
CASSETTE LID OPENER
(1)
(4)
TAKE-UP GUIDE POLE
PRESSURE ROLLER ASSEMBLY
(6)
TAKE-UP GUIDE ROLLER
DRAW ARM
(3)
INSERTION POSITIONS
PRESSURE ROLLER OPERATION ARM

Fig. 6-9 Rollers and Guides

6-10. Loading Motor Block, Brake Link Arm and FS Brake Arm

(Loading Motor Block) (Fig. 6-10)
1) Release one (1) tab and remove the cassette lid opener.
2) Disconnect the connector from the loading motor circuit board.
3) Release two (2) screws and release three (3) tabs.
4) Remove the loading motor block while holding the section shown by arrow (A) so the load bracket assembly does not lift.

[Adjustment after reinstalling]
＊Mechanism State Switch Adjustment

(Brake Link Arm) (Fig. 6-10)
5) Remove the slider block. (See item 6-7)
6) Remove the take-up reel disk. (See item 6-8)
7) Remove the S-VHS detection switch. (See item 6-8)
8) Remove the spring between the brake link arm and load bracket.
9) Release the boss of the brake lift arm and remove the brake link arm.

(FS Brake Arm) (Fig. 6-10)
10) Remove the spring between the FS brake arm and mechanism chassis.
11) Release one (1) tab and pull out the FS brake arm.

6-11. Load Bracket Assembly and Take-up Brake Assembly

(Load Bracket Assembly) (Fig. 6-11)
1) Remove the slider block. (See item 6-7)
2) Remove the take-up reel disk. (See item 6-8)
3) Remove the S-VHS detection switch. (See item 6-8)
4) Remove the pressure roller assembly. (See item 6-9)
5) Remove the loading motor block. (See item 6-10)
6) Remove the brake link arm. (See item 6-10)
7) Remove the draw arm. (See item 6-9)
8) Remove one (1) screw, release the boss of the loading slide gear from the hole in the lift arm and remove the load bracket assembly.

〈Take-up Brake Assembly〉 (Fig. 6-11)
9) Remove the brake arm. (See itme 6-12)
10) Release one (1) tab and remove the take-up brake assembly.

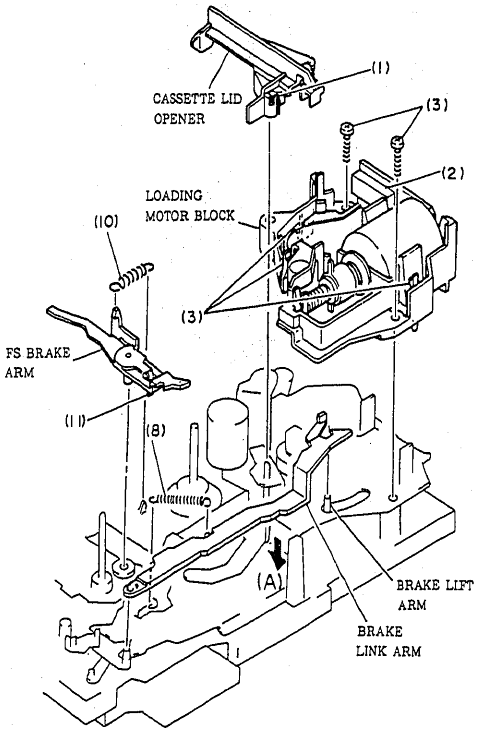

(1)
CASSETTE LID OPENER
(3)
(2)
LOADING MOTOR BLOCK
(10)
(3)
FS BRAKE ARM
(11)
(8)
(A)
BRAKE LIFT ARM
BRAKE LINK ARM

Fig. 6-10 Loading Motor Block

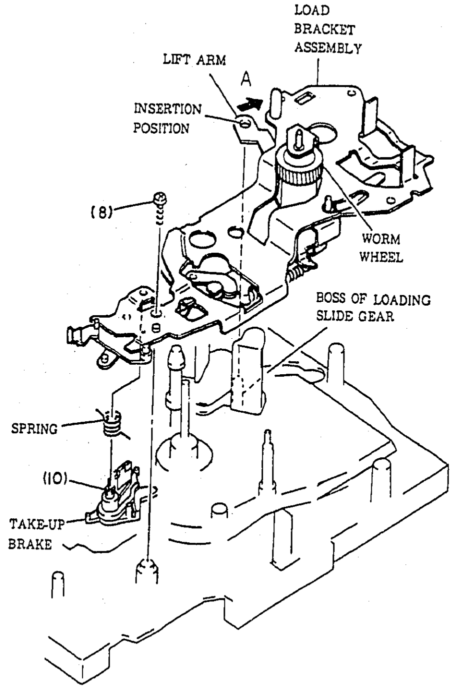

LOAD BRACKET ASSEMBLY
LIFT ARM
A
INSERTION POSITION
(8)
WORM WHEEL
BOSS OF LOADING SLIDE GEAR
SPRING
(10)
TAKE-UP BRAKE

Fig. 6-11 Load Bracket Assembly and Take-up Brake Assembly

*Removal of the components in item 6-12 is descrived as if the load bracket assembly has already been removed. (See item 6-11)

6-12. Brake Operation Arm, Mode Gear, Worm Wheel, Pressure Roller Operation Arm, Mode Change Arm and Bracket Lift Arm

(Brake Operation Arm) (Fig. 6-12)
1) Remove the washer and pull out the brake operation arm.

(Mode Gear) (Fig. 6-12)
2) Pull out the lift arm.
3) Pull out the mode gear.

(Worm Wheel) (Fig. 6-12)
4) Pull out the worm wheel.

(Pressure Roller Operation Arm, Mode Change Arm) (Fig. 6-12)
5) Remove the spring between the pressure roller operation arm and load bracket.
6) Pull out the pressure roller operation arm.
7) Release one (1) tab and pull out the mode change arm.

(Brake Lift Arm) (Fig. 6-12)
8) Pull out the brake lift arm.

[Cautions when reinstalling]
*Check that the bosses of each lever are inserted into the specified grooves in the mode gear.

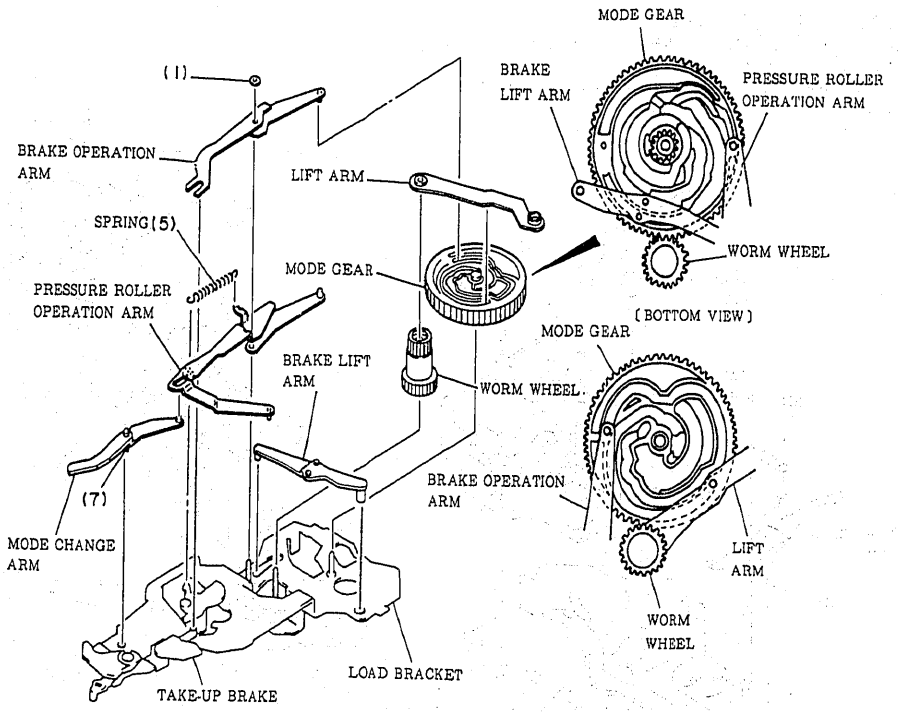

MODE GEAR
(1)
BRAKE LIFT ARM
PRESSURE ROLLER OPERATION ARM
BRAKE OPERATION ARM
LIFT ARM
SPRING(5)
WORM WHEEL
MODE GEAR
PRESSURE ROLLER OPERATION ARM
[BOTTOM VIEW]
MODE GEAR
BRAKE LIFT ARM
WORM WHEEL
(7)
BRAKE OPERATION ARM
MODE CHANGE ARM
LIFT ARM
WORM WHEEL
LOAD BRACKET
TAKE-UP BRAKE

Fig. 6-12 Arms

6-13. Cylinder Motor Base and Supply/Take-up Loading Arms

(Cylinder Motor Base) (Fig. 6-13)
1) Remove the cassette loading mechanism. (See item 5-1 in the section on cassette loading mechanism removal.)
2) Remove the cylinder motor assembly. (See item 6-2)
3) Remove three (3) screws and the cylinder motor base.

(Supply/Take-up Loading Arms) (Fig. 6-13)
4) Remove one (1) screw.
5) Remove the guide base clamp plate with the supply and take-up guide rollers assembled on it.
6) Release one (1) tab and remove the take-up loading arm.
7) Remove the supply loading arm.

(Caution when reinstalling)
*Align the markings.

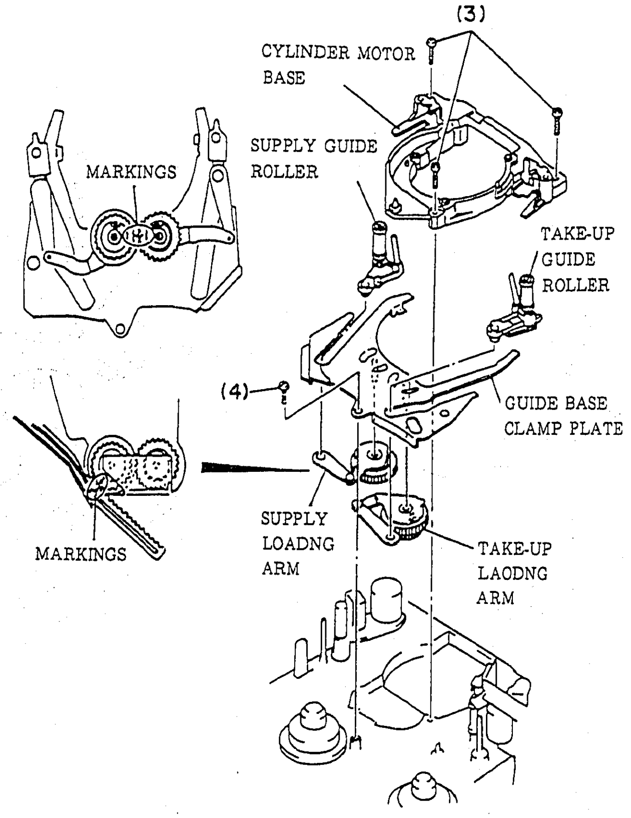

(3)
CYLINDER MOTOR BASE
MARKINGS
SUPPLY GUIDE ROLLER
TAKE-UP GUIDE ROLLER
(4)
GUIDE BASE CLAMP PLATE
SUPPLY LOADNG ARM
MARKINGS
TAKE-UP LAODNG ARM

Fig. 6-13 Cylinder Motor Base and Loading Arms

6-14. Gear Base Assembly (Fig. 6-14)

1) Remove the cassette loading mechanism. (See item 5-1 in the section on cassette loading mechanism removal.)
2) Remove the bottom cover. (See item 2-4 in the section on case removal)
3) Remove two (2) screws holding the main circuit board.
4) Remove three (3) video circuit boards (VID, ENC and DIG) and three (3) insulation sheets.
5) Remove the REG circuit board.
6) Lift the main circuit board so the bottom side of the mechanism can been seen.
*The wires of the REG circuit board are laid out on the frame, therefore, release the wires before lifting the main circuit board.
7) Remove three (3) screws and the motor cover. (See item 6-3)
8) Remove two (2) screws.

6-15. Change Arm, Change Gear and Relay Gears 1, 2 and 3

1) Remove the cassette loading mechanism. (See item 5-1 in the section on cassette loading mechanism removal.)
2) Remove the gear base assembly. (See item 6-14)

(Relay Gears 1 and 3) (Fig. 6-15)
3) Release one (1) tab and pull out relay gear 1.
4) Release one (1) tab and pull out relay gear 2.
5) Release one (1) tab and pull out relay gear 3.

(Change Gear and Change Arm) (Fig. 6-15)
6) Remove the cap, spring and washer, and pull out the change gear.
7) Release two (2) tabs and remove the change arm.

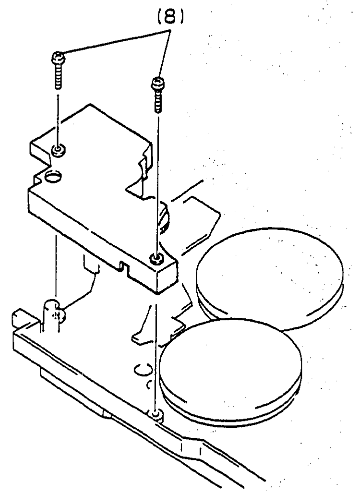


Fig. 6-14 Gear Base Assembly

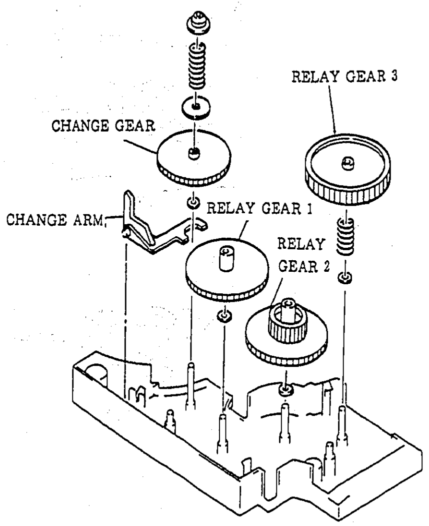


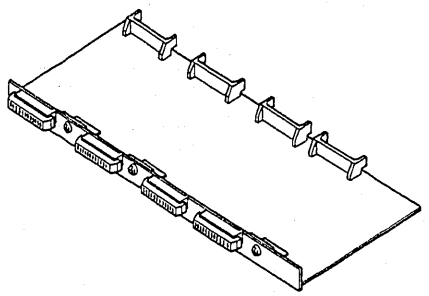
Fig. 6-15 Gears and Arms

ELECTRICAL ADJUSTMENT

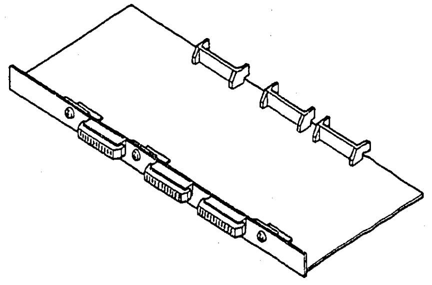
MEASUREMENT EQUIPMENT

	MEASUREMENT EQUIPMENT \ ADJUSTMENT	SERVO CIRCUIT	VIDEO ANALOG PROCESS CIRCUIT	VIDEO DIGITAL PROCESS CIRCUIT	AUDIO CIRCUIT	POWER SUPPLY CIRCUIT	IPP CIRCUIT BOARD	REMARKS
1	OSCILLOSCOPE	▨	▨	▨	▨			
2	VECTORSCOPE		▨	▨				
3	WAVEFORM MONITOR		▨	▨				
4	MONITOR TV	▨	▨					
5	FREQUENCY COUNTER						▨	
6	VIDEO SIGNAL GENERATOR (COLOR BAR GENERATOR)		▨					
7	AUDIO GENERATOR				▨			
8	SPECTRUM ANALYZER				▨			
9	VTVM(VACCUM TUBE VOLTMETER)				▨			
10	DC VOLTMETER				▨	▨		
11	DC POWER SUPPLY					▨		
12								
13	Hi-Fi ALIGNMENT TAPE (24HMASF-2)				▨			
14	ALIGNMENT TAPE(48HMP-2-1)	▨		▨				
15	RECORDED TAPE (5MHz SINGLE-WAVE SIGNAL)		▨					
16	VHS BLANK TAPE				▨		▨	
17	S-VHS BLANK TAPE				▨			
18	EXTENSION BOARD(3P,4P)			▨				
19	14P TEST CABLE							

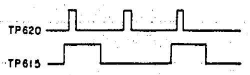
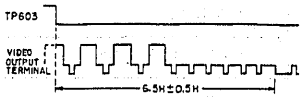
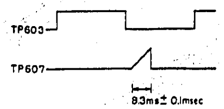
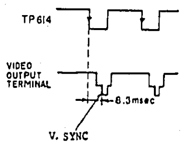
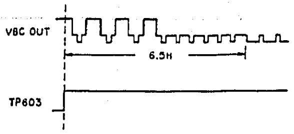
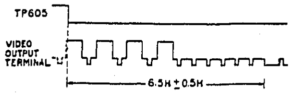
EXTENSION BOARD (4P)
- For extending the ENC and VID circuit boards

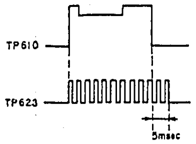


EXTENSION BOARD (3P)
- For extending the DIG circuit board



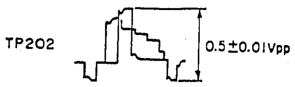
1. SERVO CIRCUIT ADJUSTMENT

	Adjustment Name	Purpose	Test Point	Procedure
1	RT601 fsc PLL Frequency Adjustment	Adjust the oscillation frequency (f_0) of the fsc PLL.	TP620 (DIG30) TP615 (SERVO REF30)	1. Set the FRAMING switch to off. 2. Play the alignment tape (48HMP-2-1). 3. Connect TP617 (VCO input) and TP618 (Vref.) 4. Connect an oscilloscope to TP620 and TP615. 5. Set the EDIT switch to OFF. 6. Adjust RT601 so the phases of both signals do not shift. 
2	RT608 PB Switching Point	Set the switching point of the video heads during play to approximately the center where the CH-1 and CH-2 envelopes overlap each other.	TP603 (REC30) VIDEO OUT	1. Play the alignment tape. (48HMP-2-1) 2. Set the VCR to the TBC OFF mode. (EDIT SW:ON, GEN LOCK SW:OFF) 3. Connect an oscilloscope to TP603 and the VIDEO OUT jack. 4. Lock both signals to the phase shown in the figure. 
3	RT605 CTL Delay Adjustment	Set the delay amount of REC CTL pulse.	TP607 (DELAY MM) TP603 (REC30)	1. Set the VCR to the play mode. 2. Connect an oscilloscope to TP603 and TP607. 3. Adjust RT607 so the delay time is as follows. t=8.3msec 
4	RT607 Play Pretracking	Set the pretracking position so that a noiseless picture is obtained with the tracking set to the center click position when a tape recorded by the same VCR is played back.	TP614 (CTL pulse) VIDEO OUT	1. Connect an oscilloscope to TP614 and the VIDEO OUT jack. 2. Load the VCR with a blank tape and set to the record mode for a few minutes. 3. Play back the recorded section. 4. Set the VCR to the TBC OFF mode. (EDIT SW:ON, GEN LOCK SW:OFF) 5. Set the tracking to the center click position. 6. Adjust RT607 so the phases of the CTL pulse and vertical sync signal are aligned. 
5	RT602 PLL Lock Phase Adjustment	Adjust the locked phase of the fsc PLL.	TP603 (REC30) VIDEO OUT	1. Play the alignment tape (48HMP-2-1). 2. Set the VCR to the TBC ON mode. (EDIT SW:OFF, GEN LOCK SW:ON) 3. Connect an oscilloscope to TP603 and the VIDEO OUT jack. 4. Adjust RT602 so both signals lock to the phase shown in the figure. 
6	RT603 PB SW30 Switching Point	Adjust the switching points of the REC monitor head and Hi-Fi audio heads.	TP605 (PB SW30) VIDEO OUT	1. Set the VCR to the record mode. 2. Connect an oscilloscope to TP605 and the VIDEO OUT jack. 3. Turn on the REC monitor. (Set the monitor picture to a full-size.) 4. Set the switching point to 6.5±0.5H from the trailing edge of the SW30 signal. 

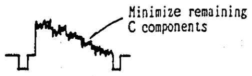
	Adjustment Name	Purpose	Test Point	Procedure
7	RT610 Slow Brake Pulse Width	Adjust the brake pulse width during slow play to stabilize tape transport.	TP610 (S/S) TP623 (CFG)	1. Connect an oscilloscope to TP610 and TP623. 2. Adjust so the CFG signal is fixed to Hi or Lo level within 5msec from the trailing edge of the S/S signal. 3. Lock both signals to the phase shown in the figure. However, the both phases are set as shown in the figure and are not reversed. 
8	RT606 Vert. Drive Pulse Adjustment	Adjust the phase of the vertical drive pulse during still play to suppress vertical jitter in the picture.	VIDEO OUT	1. Connect a monitor TV. 2. Load the VCR with a blank tape and set to the record mode for a few minutes. 3. Play back the recorded section. 4. Adjust RT606 so that no vertical jitter occurs in the still play picture.

2. ANALOG PROCESS CIRCUIT ADJUSTMENT

Input signal : Color bar with 100% white (S input)
E-E mode

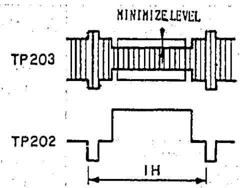
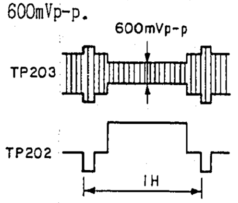
	Adjustment Name	Purpose	Test Point	Procedure
1	RT501 (ENC) EE Y Level	Set the luminance level of the EE picture.	VBS OUT	1. Set the VCR to the stop mode. 2. Connect the waveform monitor to VBS OUT. 3. Set the white peak to 100IRE.
2	RT504 (ENC) EE C Level	Set the chroma level of the EE picture. (When the chroma level of the S input EE picture does not match)	VBS OUT	1. Set the VCR to the stop mode. 2. Connect the vectorscope to VBS OUT. 3. Set each bright point to the mark ⊞.
3	RT209 (VID) Subemphasis Limiter Balance	Set the waveform characteristic in S-VHS recording.	TP201	1. Set the VCR to the stop mode. 2. Connect the oscilloscope to TP201. 3. Set the voltage to DC 3.4±0.05V.
4	RT210 HB Deviation	Set the luminance level in S-VHS recording.	TP202	1. Set the VCR to the stop mode. 2. Connect the oscilloscope to TP202. 3. Set the amplitude of the waveform to 0.5±0.01Vp-p. 

Input signal : Color bar with 100% white (LINE IN)
E-E mode

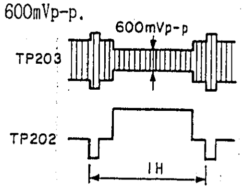
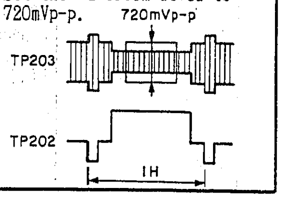
	Adjustment Name	Purpose	Test Point	Procedure
5	CP104DL RT103 (VID) Y/C Separation	Set the Y/C separation characteristics.	Y OUT (S terminal)	1. Set the VCR to the stop mode. 2. Connect the waveform monitor to Y OUT of the S terminal. 3. Set the remaining C components to a minimum. 
6	RT104 (VID) COMB-C Level	Set the chroma level of the EE picture with the LINE input (when the chroma level of the EE picture with the S connector input is correct, but the chroma level with the LINE input is not correct).	VBS OUT	1. Set the VCR to the stop mode. 2. Connect the vectorscope to VBS OUT. 3. Set each bright point to the mark ⊞.

Input signal : TG-7 Noise test chroma signal
REC mode

(VHS mode)

	Adjustment Name	Purpose	Test Point	Procedure
7	RT204 (VID) (Preparation)	Preparation for adjustment items 8-10.	TP203 TP202(H trigger)	1. Set the VCR to the record mode. 2. Connect the oscilloscope to TP203 and TP202. 3. Minimize the chroma level. 
8	RT202 (VID) LB Record Current	Set the recording current in the VHS mode (when noise or inversion is conspicuous in VHS recording/playback).	TP203 TP202(H trigger)	1. Load the VCR with a VHS blank tape and set to the record mode. (S-VHS:OFF) 2. Connect the oscilloscope to TP203 and TP202. 3. Set the waveform level to 600mVp-p. 

(S-VHS mode)

	Adjustment Name	Purpose	Test Point	Procedure
9	RT201 (VID) HB Record Current	Set the recording current in the S-VHS mode (when noise or inversion is conspicuous in S-VHS recording/playback).	TP203 TP202(H trigger)	1. Set the S-VHS switch to AUTO. 2. Load the VCR with an S-VHS blank tape and set to the record mode. 3. Connect the oscilloscope to TP203 and TP202. 4. Set the waveform level to 600mVp-p. 
10	RT204 (VID) C Record Current	Set the recording current of the chroma signal (when the chroma S/N of the recording/playback picture is defective and dot interference is conspicuous).	TP203 TP202(H trigger)	1. Set the VCR to the record mode. 2. Connect the oscilloscope to TP203 and TP202. 3. Set the waveform level to 720mVp-p. 

REC mode

	Adjustment Name	Purpose	Test Point	Procedure
11	RT211 (VID) Mode Discrimination Threshold Level	Set the threshold level to discriminate between the S-VHS and VHS modes (when the discrimination between S-VHS and VHS is not correct).	TP204 and TP205	1. Set the VCR to the record mode. 2. Connect the oscilloscope to TP204 and TP205. 3. Connect the video signal generator and apply a 5MHz single-wave signal. 4. Make the DC voltages at TP204 and TP205 the same.

PLAY mode
Recording signal : Color bar with 100% white (S-VHS mode)
TBC OFF mode (EDIT SW : ON, GEN LOCK SW : OFF)

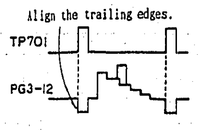
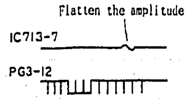
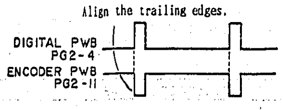
	Adjustment Name	Purpose	Test Point	Procedure
12	RT213 (ENC) Subemphasis Limiter Balance	Set the waveform characteristics in S-VHS playback.	TP303	1. Set the VCR to the play mode. 2. Connect the oscilloscope to TP303. 3. Set the voltage level to DC 3.4±0.05V.
13	RT212 (ENC) DOC	Set the luminance level of dropout compensation (when missing of white or black, etc. occurs at a section where dropout occurs).	TP304 HIC202 pin 13	1. Set the VCR to the play mode. 2. Connect the oscilloscope to TP304 and HIC202 pin 13. 3. Equalize the signal levels.
14	RT206 (ENC) PB Through Y Level [HB]	Set the luminance level of the S-VHS playback picture (when the luminance level in trick play is not correct).	VBS OUT	1. Set the VCR to the play mode. 2. Connect the waveform monitor to VBS OUT. 3. Set the white peak to 100IRE.
15	RT505 (ENC) PB Through C Level	Set the chroma level in trick play.	VBS OUT	1. Set the VCR to the play mode. 2. Connect the vectorscope to VBS OUT. 3. Set each bright point to the level in the mark ⊞.

PLAY mode
Recording signal : Color bar with 100% white (VHS mode)
TBC OFF mode (EDIT SW : ON, GEN LOCK SW : OFF)

	Adjustment Name	Purpose	Test Point	Procedure
16	RT207 (ENC) PB Through Y Level [LB]	Set the luminance level of VHS playback picture (when the luminance level in trick play is not correct).	VBS OUT	1. Set the VCR to the play mode. 2. Connect the waveform monitor to VBS OUT. 3. Set the white peak to 100IRE.

3. DIGITAL PROCESS CIRCUIT ADJUSTMENT

Signal : Color bar (IQ signal and with 100% white)
PLAY and GENLOCK state

	Adjustment Name	Purpose	Test Point	Procedure
1	L725 (DIG) PB VCO Lock Voltage	Set the operation voltage of the VCO in the playback system.	TP801	1. Set the VCR to the play mode. 2. Connect the oscilloscope to TP801. 3. Set the voltage to 4.5V center.
2	RT701 (DIG) PB H Phase	Set the horizontal position of the playback picture.	TP701 PG3 pin 12 (H trigger)	1. Set the VCR to the play mode. 2. Connect the oscilloscope to TP701 and PG3 pin 12. 3. Align the trailing edges. 
3	RT702 (DIG) Initial Reset Phase	Correct skew across the top of the screen.	TP801 PG3 pin 12 (V trigger)	1. Set the VCR to the play mode. 2. Connect the oscilloscope to TP801 and PG3 pin 12. 3. Flatten the amplitude shown in the figure. 
4	CT701 (DIG) Reference VCO Lock Voltage	Set the operation voltage of the VCO generating the reference signal.	TP901	1. Set the VCR to the play mode. 2. Connect the oscilloscope to TP901. 3. Set the voltage to 4V center.
5	RT703 (DIG) Reference H Phase	Set the horizontal position of the picture.	PG2 pin 4 (DIG) PG2 pin 11 (ENC) (H trigger)	1. Set the VCR to the play mode. 2. Connect the oscilloscope to PG2 pin 4 (DIG) and PG2 pin 11 (ENC). 3. Align the trailing edges.  Align the trailing edges. DIGITAL PWB PG2-4 ENCODER PWB PG2-11
6	RT503 (ENC) DIG PB Sync Level	Set the sync level of the playback picture.	VBS OUT	1. Set the VCR to the play mode. 2. Connect the waveform monitor to VBS OUT. 3. Set the sync level to 40IRE.
7	RT502 (ENC) DIG PB Y Level	Set the luminance level of the playback picture (when the luminance level of the trick play picture is correct, but that of the GEN LOCK playback is not correct).	VBS OUT	1. Set the VCR to the play mode. 2. Connect the waveform monitor to VBS OUT. 3. Set the white peak to 100IRE.
8	RT510 (ENC) Encoder Input Level	Optimize the tint of the playback picture.	TP306	1. Set the VCR to the play mode. 2. Connect the oscilloscope to TP306. 3. Adjust RT510 so the output at TP306 is 1.4Vp-p.
9	RT512 (ENC) Burst Level Coarse Adjustment	Preparation	VBS OUT	1. Set the VCR to the play mode. 2. Connect the vectorscope to VBS OUT. 3. Set the burst level to the specified.
10	RT507, RT508 (ENC) White Balance	Optimize the white balance of the playback picture.	VBS OUT	1. Set the VCR to the play mode. 2. Connect the vectorscope to VBS OUT. 3. After magnification, set the center bright point to the center of the vectorscope.
11	RT506 (ENC) Encoder Output Level	Set the chroma level of the playback picture.	VBS OUT	1. Set the VCR to the play mode. 2. Connect the vectorscope to VBS OUT. 3. Set the R brigh point to the level in the mark 田.
12	RT511 (ENC) Tint	Optimize the tint of the playback picture. (B-Y) Level Adjustment	VBS OUT	1. Set the VCR to the play mode. 2. Connect the vectorscope to VBS OUT. 3. Set YL in the mark 田.
13	RT512 (ENC) Burst Level	Set the burst level of the playback picture. (R-Y) Level Adjustment	VBS OUT	1. Set the VCR to the play mode. 2. Connect the vectorscope to VBS OUT. 3. Set the burst level to the specified level.
14	RT509 (ENC) Tint	Optimize the tint of the plalyback picture.	VBS OUT	1. Set the VCR to the play mode. 2. Connect the vectorscope to VBS OUT. 3. Set the R bright point to the level in the mark 田.
15	RT705, RT706 (DIG) Tint Precise Adjustment	Optimize the tint of the playback picture.	VBS OUT	1. Set the VCR to the play mode. 2. Connect the vectorscope to VBS OUT. 3. Set YL in the mark 田. (Do not turn too much) Set the vertical position of each bright point by RT705. Set the horizontal position of each bright point by RT706.

Repeat adjustment items 11~14.

Simultaneous monitor/split state.

	Adjustment Name	Purpose	Test Point	Procedure
16	RT704 (DIG) P in P Tint	Optimize the tint of the small picture in the simultaneous monitor mode.	VBS OUT Monitor Screen	1. Set the SC PHASE volume on the side to the center. 2. Load the VCR with a blank tape and record the color bar signal for a few minutes. 3. Connect the vectorscope to VBS OUT and connect the monitor TV. 4. Turn to REC MONITOR (SPLIT) on. 5. Align each bright point with the mark 田. 6. Check that the tint of the sub-screen matches that of the main screen visually.

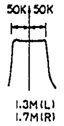
4. AUDIO CIRCUIT ADJUSTMENT

4-1 Linear Audio Block Adjustment

Normal input select : LINE
Hi-Fi/Normal switch : NOR
Limiter : OFF

	Adjustment Name	Purpose	Test Point	Procedure
1	RT405 L/R (MAS) PB Level Adjustment	Set the linear audio playback level to the specified value.	LINE OUT CH-1/CH-2	1. Play the MH-1 alignment tape. (1kHz audio signal of the color bar section). 2. Connect the VTVM to CH-1 (CH-2) LINE OUT. 3. Set both the CH-1 and CH-2 outputs to -7±0.2dBs. Reference : 0dBs=775mVrms =220mVp-p
2	RT403 L/R (MAS) REC Bias Level Adjustment (S-VHS)	Set the recording bias level when using an S-VHS tape to the optimum value.	TP401 L/R TP402 L/R	1. Load a blank tape (S-VHS) and set the VCR to the record mode. 2. Connect the VTVM to TP401 L/R (HOT) and TP402 L/R (GND). 3. Set the output to 3.5±0.1mV (-49dBv).
3	RT404 L/R (MAS) REC Bias Level Adjustment (VHS)	Set the recording bias level when using a VHS tape to the optimum value.	TP401 L/R TP402 L/R	1. Load a blank tape (VHS) and set the VCR to the record mode. 2. Connect the VTVM to TP401 L/R(HOT) and TP402 L/R(GND). 3. Set the output to 3.3±0.1mV (-49.6dBv).
4	RT402 L/R (MAS) REC Level Adjustment	Set the linear audio recording level to the optimum value.	TP405 L/R	1. Connect the VTVM to TP405 L/R and GND LINE OUT. 2. Apply a 1kHz, -7.8dBs signal to LINE IN. 3. Adjust the record level volume so the line output level is -7.8±0.1dBs. 4. Adjust RT402L so the output difference between TP405L and GND is -2.7±0.1dBs. 5. Adjust RT402R so the output difference between TP405R and GND is -1.7±0.1dBs. 6. Confirm the output level -7.8±0.5dBs while repeating recording and playback. 7. If it is not, re-adjust according to the following procedure. Output level : -7.8±XdBs Turn RT402L/R to set the output level between TP405L/R and GND to -/+XdBs. Set the VCR to the record mode and then play the recorded tape, and confirm the output level -7.8±0.5dBs. Repeat item 7 if it is not within the specification.

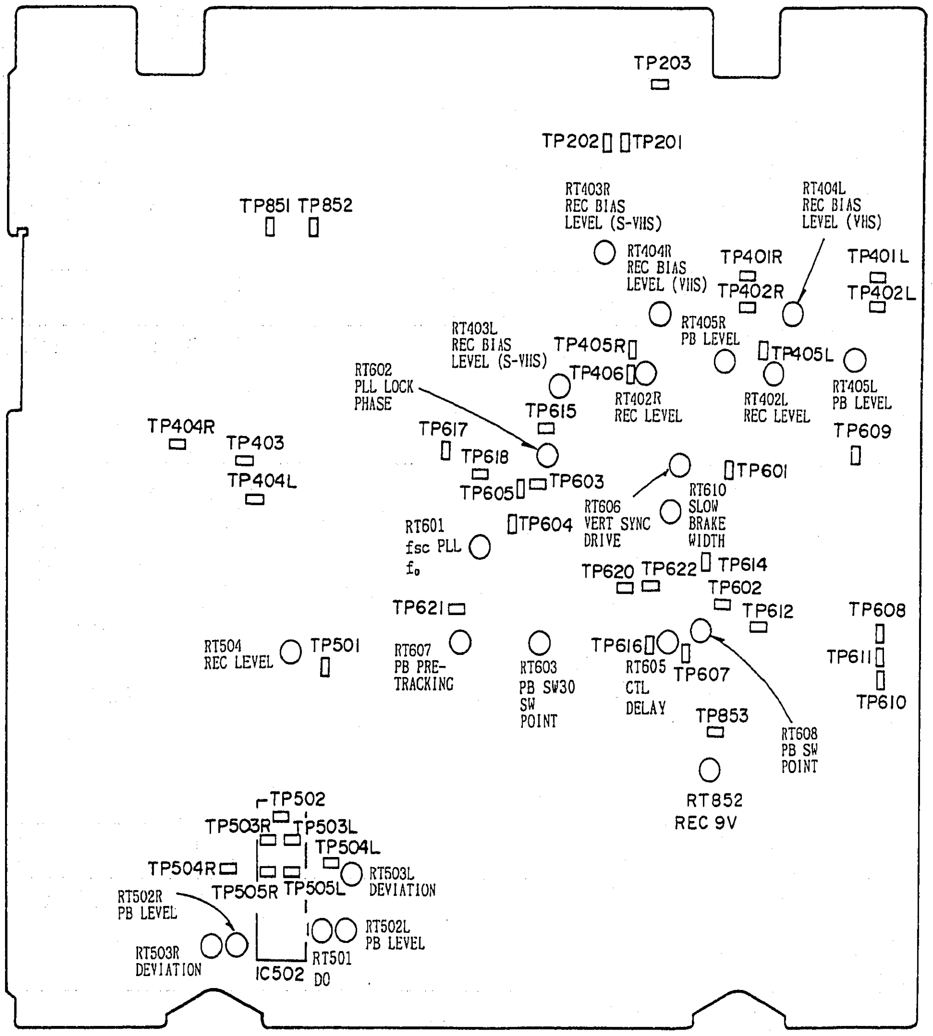
4-2 Hi-Fi Audio Block Adjustment
Hi-Fi/Normal switch : Hi-Fi
Adjust RT603 (SW30A) for the switching point previously before this adjustment.

	Adjustment Name	Purpose	Test Point	Procedure
5	RT502 L/R (MAS) PB Level Adjustment	Set the Hi-Fi audio playback level to teh specified value.	CH-1/CH-2 LINE OUT	1. Play the 24HMASF-2 tape (50kHz modulation). 2. Set the Hi-Fi/normal select switch to Hi-Fi. 3. Connect the VTVM to CH-1 (CH-2) LINE OUT. 4. Set both CH-1 and CH-2 outputs to -4.8±0.1dBs.
6	RT501 (MAS) DO (Drop out) Adjustment	Set the Hi-Fi audio (presence /absence) detection level.	IC502 pin 18	1. Set the VCR to the stop mode. 2. Connect the DC voltmeter to IC502 pin 18. 3. Set the output to 4.2±0.1V.
7	RT504 (MAS) REC Level	Set the carrieer level in the Hi-Fi audio signal to the optimum value.	TP501	1. Load a blank tape and set the VCR to the record mode. Do not input an audio signal. 2. Connect the oscilloscope to TP501. 3. Set the output to 0.9Vp-p.
8	RT503 L/R (MAS) Deviation Adjustment	Set the Hi-Fi audio recording level to the optimum value.	TP505L TP505R	1. Connect the audio generator to AUDIO IN (either L or R) and apply a 1kHz, -4.8±0.1dBs signal. 2. Load a blank tape and set the VCR to the record mode. **(When using the spectrum analyzer)** 3. Connect the spectrum analyzer to TP505 L/R. 4. Set the deviation of each channel to 50kHz. **(When using the VTVM)** 3. Connect the VTVM to TP505L/R. 4. Play the tape recorded in step 2. 5. Adjust RT503L/R so the output level is -4.8±0.5dBs. SPECTRUM ANALYZER WAVEFORM 
9	RT751, RT752 (FSW) Level Meter Adjustment	Adjust the deviation of the level meter normally.	LINE OUT (CH-1/CH-2) LEVEL METER (CH-1/CH-2)	1. Connect the audio generator to LINE IN and apply a 1kHz, -4.8±0.2dBs signal. 2. Set the Hi-Fi/normal switch on the front panel to Hi-Fi. Set the Hi-Fi input select switch on the side panel to LINE. 3. Connect the VTVM to CH-1 (CH-2) LINE OUT. 4. Adjust the Hi-Fi level control on the front panel so both the CH-1 and CH-2 outputs at LINE OUT to -4.8 ±0.2dBs. 5. Adjust RT751 (CH-1) and RT752 (CH-2) so the CH-1 and CH-2 level meters indicate 0VU.

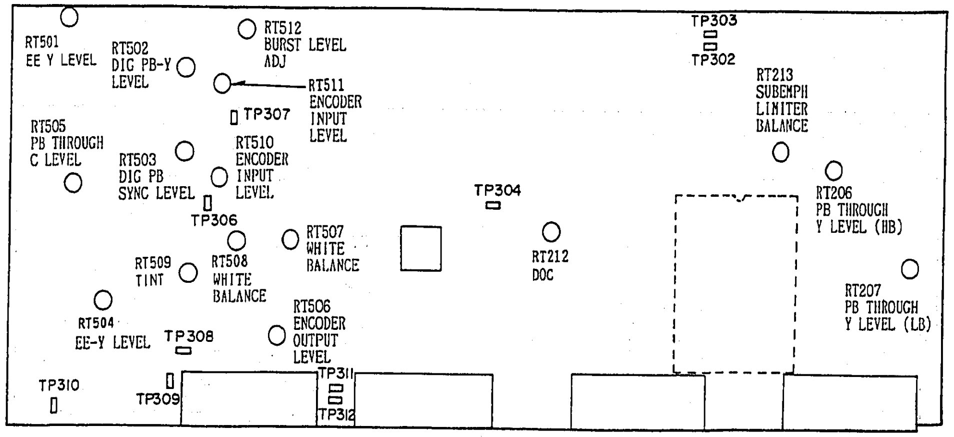
5. POWER SUPPLY CIRCUIT (FSW, REG and MAS CIRCUIT BOARDS) AND IPP CIRCUIT BOARD ADJUSTMENT

	Adjustment Name	Purpose	Test Point	Procedure
1	RT753 (FSW) Battery Empty and Shutoff Voltage Adjustment	Set the battery shut off voltage.	BATT LED.	1. Turn RT753 fully clockwise. 2. Connect a DC power supply to DC jack and the DC voltmeter to the DC voltage output. 3. Set the power voltage to 11.35~11.39V. 4. Turn RT753 counterclockwise and stop it where the BATT LED starts to flash. 5. Set the power voltage to 11.4V and adjust RT753 so the BATT LED goes off. 6. After adjustment, check that the VCR power is shut off when the power voltage is 10.8V or less. If this cannot be confirmed, re-adjust RT753.
2	RT801 (REG) A5V Adjustment	Adjust the output voltage of the DC/DC converter (12V to 5V).	PG1849 pin3···(+) pin2···(-)	1. Turn the power switch ON and set the VCR to the stop mode. 2. Connect the DC voltmeter to PG1849 pin 3(+) and pin 2(-). 3. Adjust RT801 so the output level is 6.0±0.1V.
3	RT852 (MAS) REF9V Adjustment	Adjust the power voltages of the 5V and 9V systems.	TP853···(+) TP852···(-)	1. Turn the power switch ON and set the VCR to the stop mode. 2. Connect the DC voltmeter to TP853(+) and TP852(-). 3. Adjust RT801 so the output level is 9.00±0.05V.
4	CT1 (IPP) FE OSCILLATION FREQUENCY Adjustment	Set the erase ratio of the flying erase head to the optimum value.	PG12 pin1	1. Load the VCR with a recorded tape and set to the video dubbing mode. (PLAY→PAUSE→DUB+REC→PAUSE) 2. Connect the frequency counter between PG12 pin 1 and the frame GND. 3. Adjust CT1 so the output frequency to 200-300kHz.

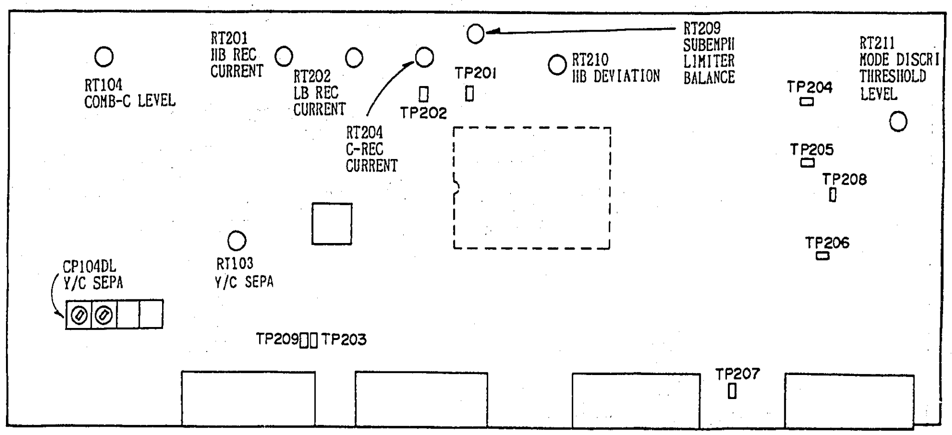
Adjustment Parts Location


TP203
TP202
TP201
TP851
TP852
RT403R REC BIAS LEVEL (S-VHS)
RT404L REC BIAS LEVEL (VHS)
RT404R REC BIAS LEVEL (VHS)
TP401R
TP401L
TP402R
TP402L
RT405R PB LEVEL
RT403L REC BIAS LEVEL (S-VHS)
TP405R
TP405L
TP406
RT602 PLL LOCK PHASE
TP615
RT402R REC LEVEL
RT402L REC LEVEL
RT405L PB LEVEL
TP404R
TP403
TP617
TP618
TP609
TP601
TP404L
TP605
TP603
RT610 SLOW BRAKE WIDTH
RT606 VERT SYNC DRIVE
RT601 fsc PLL f₀
TP604
TP620
TP622
TP614
TP602
TP621
TP612
TP608
RT504 REC LEVEL
TP501
RT607 PB PRE-TRACKING
RT603 PB SW30 SW POINT
TP616
RT605 CTL DELAY
TP607
TP611
TP610
TP853
RT608 PB SW POINT
RT852 REC 9V
TP502
TP503R
TP503L
TP504L
TP504R
RT503L DEVIATION
RT502R PB LEVEL
TP505R
TP505L
RT502L PB LEVEL
RT503R DEVIATION
RT501 DO
IC502

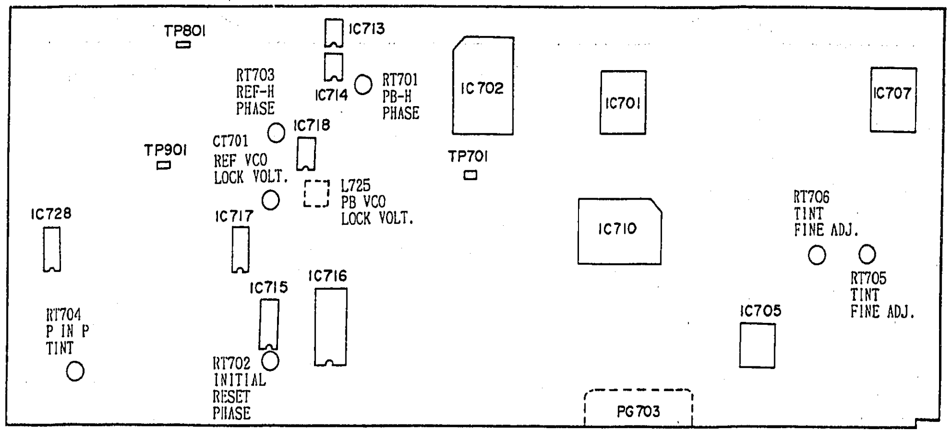
MAS PCB


RT501
EE Y LEVEL
RT502
DIG PB-Y
LEVEL
RT512
BURST LEVEL
ADJ
RT511
ENCODER
INPUT
LEVEL
TP307
RT505
PB THROUGH
C LEVEL
RT503
DIG PB
SYNC LEVEL
RT510
ENCODER
INPUT
LEVEL
TP306
RT509
TINT
RT508
WHITE
BALANCE
RT507
WHITE
BALANCE
RT504
EE-Y LEVEL
TP308
RT506
ENCODER
OUTPUT
LEVEL
TP310
TP309
TP311
TP312
TP304
RT212
DOC
TP303
TP302
RT213
SUBEMPH
LIMITER
BALANCE
RT206
PB THROUGH
Y LEVEL (HB)
RT207
PB THROUGH
Y LEVEL (LB)

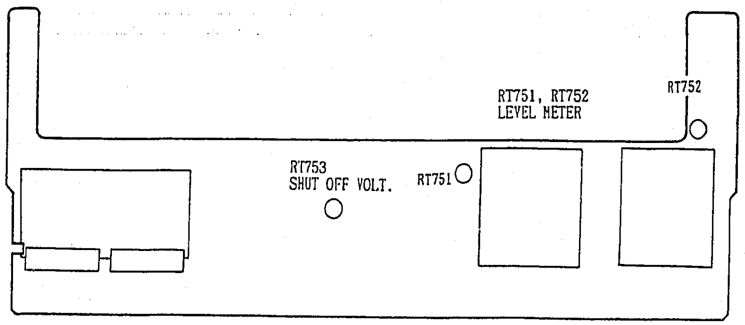
ENCODER PCB (ENC)


RT104
COMB-C LEVEL
RT201
HB REC
CURRENT
RT202
LB REC
CURRENT
RT204
C-REC
CURRENT
TP202
TP201
RT210
HB DEVIATION
RT209
SUBEMPH
LIMITER
BALANCE
TP204
RT211
MODE DISCRI
THRESHOLD
LEVEL
TP205
TP208
TP206
CP104DL
Y/C SEPA
RT103
Y/C SEPA
TP209
TP203
TP207

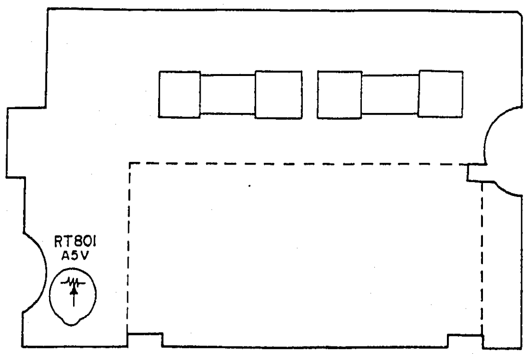
VIDEO PCB (VID)


TP801
IC713
IC714
RT703
REF-H
PHASE
RT701
PB-H
PHASE
IC702
IC701
IC707
IC718
CT701
REF VCO
LOCK VOLT.
TP901
L725
PB VCO
LOCK VOLT.
TP701
IC728
IC717
IC710
RT706
TINT
FINE ADJ.
RT705
TINT
FINE ADJ.
IC715
IC716
IC705
RT704
P IN P
TINT
RT702
INITIAL
RESET
PHASE
PG703

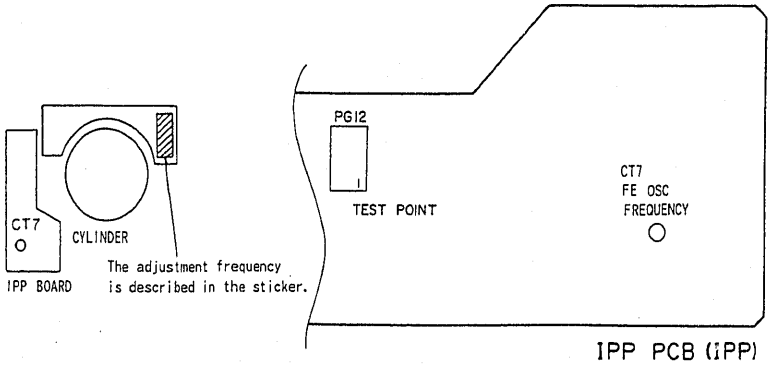
DIGITAL PCB (DIG)


RT751, RT752
LEVEL METER
RT752
RT753
SHUT OFF VOLT.
RT751

FRONT SWITCH PCB (FSW)



REGULATOR PCB (REG)


CT7
IPP BOARD
CYLINDER
PG12
TEST POINT
CT7
FE OSC
FREQUENCY

The adjustment frequency is described in the sticker.

IPP PCB (IPP)

6. DEBUGGING THE VID/ENC/DIG CIRCUIT BOARDS

Check waveforms following the signal flow. If waveforms are defective, there is a possibility that the circuit between the point being currently observed and the point in the previous stage is defective. There is a possibility in a rare case that the component applied with a load is broken.

The waveforms in the schematic diagrams are observed in the EE mode. They may be slightly different in the different conditions of observation.

Analog Signal Processor

1. EE-Y level

VID-(1) IC107-14	Luminance signal
ENC-(2) Q501-E	Luminance signal (RT501 must be adjusted. R SYNC at PG4-1 may not be output.)
(3) IC502-3	Same as above

2. EE-C level

VID-(4) IC106-10	Chroma signal
ENC-(5) IC503-12	Chroma signal (RT514 must be adjusted)
(6) Q511-E	Same as above

3. Limiter balance of subempahsis
   No special check is required.

4. HB deviation

VID-(7) HIC201-30	Luminance signal (Signal flows to HIC201 pins 14, 13, 10 and 30.)
(8) Q202-E	Same as above
(9) Q203-E	Same as above
(10) TP202	Same as above

5. Y/C separation

VID-(11) IC104-7	14.3MHz carrier signal (Check the defect of RH2-3 RFsc, IC105)
(12) Q116-E	Composite signal level
(13) Q121-E	Luminance signal
(14) Q110-E	Line difference signal
(15) IC107-16	Luminance signal

6. COM-C level

VID-(16) IC106-8	Chroma signal

7. (preparatory work)
   No special work is required.

8. LB recording current

VID-(17) HIC201-34	FM signal
(18) Q209-E	FM signal
(19) TP203	FM signal

9. HB recording current

VID-(20) Q207-E	FM signal

10. C recording current

VID-(21) IC203-11	C.SYNC signal (with waveform distortion)
(22) IC203-10	Subcarrier signal Is its phase locked to that of the input video signal?
(23) IC203-4	Down-converted chroma signal
(24) Q219-E	Down-converted chroma signal

11. Mode discrimination threshold level

VID-(25) IC201-19	Sine-wave signal
(26) IC204-4	Sine-wave signal

12. Playback C comb filter
    When a trouble occurs, use a color bar signal as a signal source and observe the waveforms.

ENC-(27) Between R337 and L234	Down-converted chroma signal
(28) IC208-28	Chroma signal
(29) IC208-21	Chroma signal
(30) Q240-E	Chroma signal

13. Limiter balance of subemphasis
    No special check is required.

14. DOC

ENC-(31) HIC202-30	FM signal
(32) HIC202-29	Luminance signal
(33) IC205-1	Luminance signal
(34) HIC202-40	Luminance signal
(35) HIC202-13	Luminance signal
(36) IC206-7	10.8MHz carrier signal (Check PFsc at Q239-E and IC207)
(37) TP304	Luminance signal

15. PB through Y level (HB)

ENC-(38) HIC202-24	Luminance signal

16. PB through C level

ENC-(39) IC503-3	Chroma signal (RT505 must be adjusted)

17. PB through Y level (LB)

ENC-(40) HIC202-9	Luminance signal
(40*)HIC202-38	FM signal

Digital Signal Processor

1. PB VCO lock voltage

DIG-(41) Output of IC733	14.3MHz clock signal
(42) Q725-B	TRSP (horizontal sync) pulse
(43) Q726-B	SMPP (horizontal sync) pulse
(44) Q725-C	Trapezoidal signal

2. PB H phase
   Same as above

3. Initial reset phase

DIG-(45) IC715-9	PHP1 (horizontal sync) pulse (The input is PHPO pulse at IC715-11)

4. REF VCO lock voltage

DIG-(46) Output of IC732	14.3MHz clock signal
(47) Q732-B	TRSR (horizontal sync) pulse
(48) Q733-B	SMPR (horizontal sync) pulse
(49) Q732-C	Trapezoidal signal

5. REF H phase

DIG-(50) PG3-4	Is the C.SYNC signal synchronized with the input video signal?

6. Encoder input level

DIG-(51) IC705-24	Chroma signal
(52) IC705-19	R-Y signal
(53) IC705-18	B-Y signal
(54) Q720-E	R-Y signal
(55) Q723-E	B-Y signal
(56) IC706-1	R-Y signal
(57) IC706-4	B-Y signal
(58) IC706-6	1.8MHz clock signal
(59) IC707-43	Mixture of color-difference signals
(60) Q705-E	DC3.5V
(61) Q706-E	DC1.5V
(62) PB2-8	R-Y signal
(63) PG2-7	B-Y signal
ENC-(64) Q512-E	R-Y signal
(65) Q517-E	B-Y signal
(66) TP306	R-Y signal
(67) TP307	B-Y signal (Burst signal is added by RT512)

7. White balance
No special check is required.

8. Encoder output level

ENC-(68A) IC730 side of R296	3.58MHz carrier signal
(68A) IC726-4	3.58MHz carrier signal (The phase is shifted by the external SC control by 360° with respect to that of the burst signal in the input video signal)
(68C) IC724-9	Same as above
(68) Q518-B	3.58MHz carrier signal
(69) Q519-E	3.58MHz carrier signal (The phase is shifted by 90° from the carrier signal at Q518-B)
(70) IC503-14	Chroma signal (The level can be varied by RT506)

9. Burst level coarse adjustment
This is included in item 8.

10. Tint adjustment
Same as above

11. Tint fine adjustment
Included in item 6.

12. Burst level
Same as in item 9

13. Encoder output level
Same as in item 8

14. DIG PB SYNC level

VID-(71A) Q701-E	Luminance signal
(71B) Q704-S	Luminance signal (clamped output)
(71C) Q902-E	Same as above
ENC-(71) PG2-6	Luminance signal (without sync signal)
(72) Q502-E	Same as above
(73) Q509-B	Same as above (DC2.2V at the pedestal section can be varied by RT516)
(74) IC501-14	Luminance signal (with sync signal)

15. DIG PB-Y level
Included in item 14.

16. P in P tint

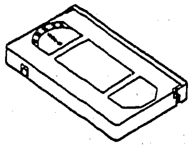
DIG-(75) IC727-12	3.58MHz carrier signal (The phase is shifted by RT704 from that of the burst signal in the input video signal.)

If the gate array, memory, etc. between the A/D and D/A converters are difective, the signals output from the D/A converters become abnormal. However, it is difficult to locate the defective section more precisely. There are no small components at this section and it can be considered that the defect occurs due to a contact between pins of ICs or a trouble in the countermeasured section, etc., so visually check them carefully.

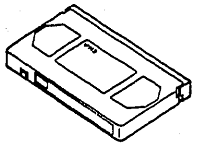
MECHANISM ADJUSTMENT

LIST OF TAPES AND JIGS

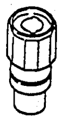
1. Tension Cassette
(Back-tension meter)
Parts No. 7099004



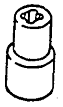
2. Alignment Tapes
48HMP-2-1 (Hi-Fi) Parts No. 7099357
MH-1 Parts No. 7099046
24HMASF-2 (Hi-Fi) Parts No. 7099153



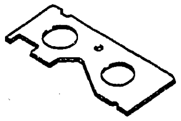
3. Torque Gauge
Parts No. 7099039



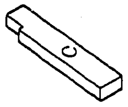
4. Torque Gauge Adapter
Parts No. 7099035



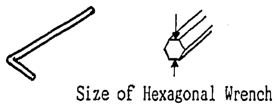
5. Master Plane
Parts No. 7099279



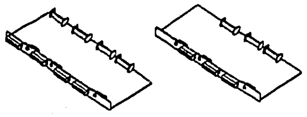
6. Reel Height Jig
Parts No. 7099038



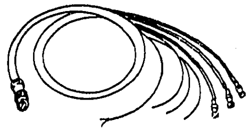
7. 0.9mm Hexagonal Wrench
1.5mm Hexagonal Wrench



8. Extension P.C.B
4-Pin Parts No. 7099355
3-Pin Parts No. 3099356

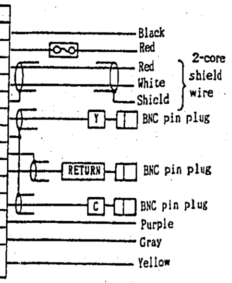


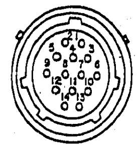
9. 14-Pin Test Cable
Parts No. 7099358



14-Pin Test Cable

Pin No.	Details
1	GND
2	DC 12V OUT
3	MIKE IN (HOT)
4	MIKE IN (COLD)
5	MIKE IN (GND)
6	VIDEO IN/Y IN
7	VIDEO IN/Y IN (GND)
8	RETURN VIDEO (GND)
9	RETURN VIDEO OUT
10	BATTERY INDI OUT
11	C IN
12	REC/ALARM OUT
13	VCR START/STOP IN
14	POWER SAVE IN & AUDIO MONITOR OUT

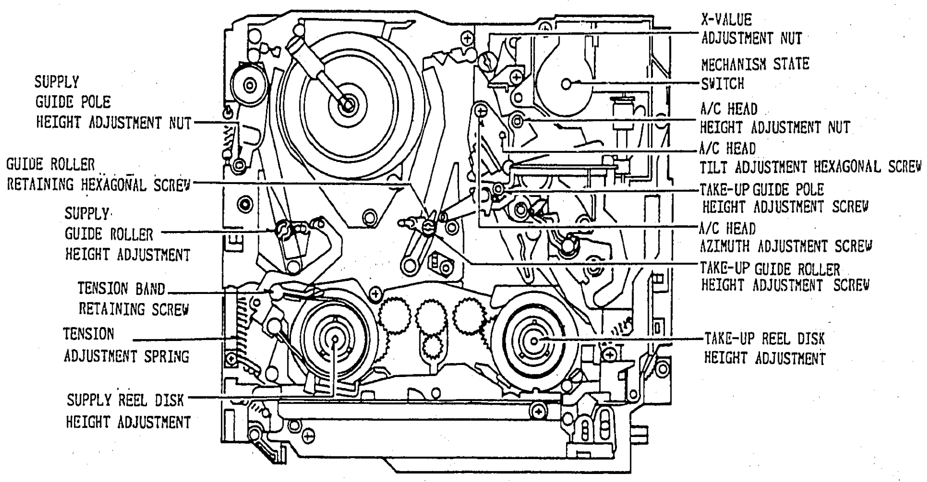




14-PIN PLUG

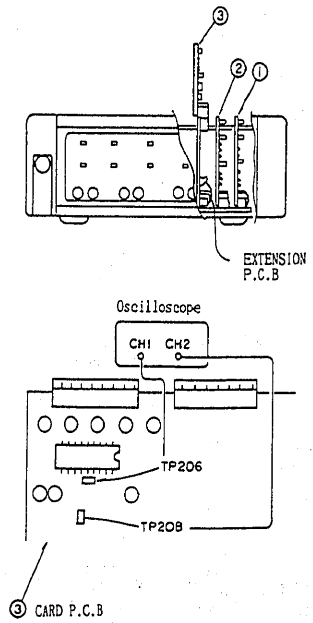
1. **GND** AWG#20 Black
2. **DC12V OUT** AWG#20 Red
   Camera power output. A 2A fuse is in the holder.
   This is output when the VCR power switch is turned on.
3. **MIKE IN (HOT)** 2-core shield wire Red
4. **MIKE IN (COLD)** White
5. **MIKE IN (GND)** Shield
   An audio generator is connected and a -20dBs signal is input. Check that the VU meter deviates as an audio select input of the VCR.
   Normally, connect the COLD and GND pins to ground (unbalanced connection).
   A differential input may be connected between the HOT and COLD pins (balanced connection).
6. **VIDEO IN/Y IN** BNC plug
   When VCR's camera selection is VBS, an NTSC signal is connected.
   When VCR's camera selection is Y/C, a Y signal is connected.
7. **VIDEO IN (GND)**
8. **RETURN VIDEO (GND)**
9. **RETURN VIDEO OUT** BNC plug
   EE output when the VCR is in the stop mode.
10. **BATTERY INDI OUT**
    Not connected with a test connector.
    When the battery is nearly discharged, it flashes.
    When the battery is completely discharged, it lights.
11. **C IN** BNC plug
    When VCR's camera selection is Y/C, a C signal is connected.
12. **REC/ALARM OUT** AWG#24 Purple
    0V when power is off. 2.5V when power is on.
    5V during recording
13. **VCR START/STOP IN** AWG#24 Gray
    Lo(0.8V or less): The VCR enters the pause mode during recording
    Hi(2V or more): Pause is released during recording.
14. **POWER SAVE IN/AUDIO MONITOR OUT** AWG#24 Yellow
    Power save(4.5±0.5V): The back light of the LCD and meter goes out. Turns off many circuits.

ADJUSTMENT PARTS LOCATIONS


SUPPLY GUIDE POLE HEIGHT ADJUSTMENT NUT
GUIDE ROLLER RETAINING HEXAGONAL SCREW
SUPPLY GUIDE ROLLER HEIGHT ADJUSTMENT
TENSION BAND RETAINING SCREW
TENSION ADJUSTMENT SPRING
SUPPLY REEL DISK HEIGHT ADJUSTMENT
X-VALUE ADJUSTMENT NUT
MECHANISM STATE SWITCH
A/C HEAD HEIGHT ADJUSTMENT NUT
A/C HEAD TILT ADJUSTMENT HEXAGONAL SCREW
TAKE-UP GUIDE POLE HEIGHT ADJUSTMENT SCREW
A/C HEAD AZIMUTH ADJUSTMENT SCREW
TAKE-UP GUIDE ROLLER HEIGHT ADJUSTMENT SCREW
TAKE-UP REEL DISK HEIGHT ADJUSTMENT

Connection Diagram
Perform the following connections after installing and extension P.C.B between cart circuit board (3) and the main circuit board, when adjusting the height of the guide rollers (precise adjustment) and X-value and performing the adjustments after the cylinder (video heads) is replaced.

⟨Setting of oscilloscope⟩
- Trigger with CH-2.


③
②
①
EXTENSION P.C.B
Oscilloscope
CH1
CH2
TP206
TP208
③ CARD P.C.B

Note : To set the VCR to the loading state without inserting a cassette

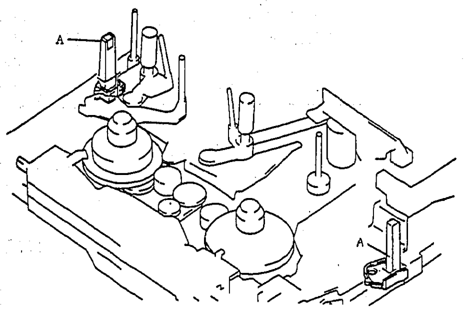
1) Remove the top cover and front panel.
2) (Remove the cassette loading mechanism.)
3) Shut off the DC input.
4) Cover the supply and take-up end sensors (sections A in the figure below) with black masking tape, etc. to shut off the light.
5) Supply DC input.
6) Turn on the power to the VCR.
   The VCR can accept each operation mode in this state. However, the rewind operation cannot be performed for more than a few seconds because the take-up reek disk is in the stop state and reel pulses cannot be detected.

Cautions : Be sure to return the VCR to its original state in the following order after the above operations are performed.

1) Remove the masking tape, etc. from the supply and take-up end sensors.
2) Shut off the DC input to reset the system control microprocessor.
3) Supply DC input and turn the power on again.

↓

The VCR is now restored to the normal state.



LIST OF MECHANISM ADJUSTMENTS

No.	Tapes and jigs / Adjustment	Mechanism state switch	Reel disk	Tension pole	Guide pole	Guide roller	A/C head	Overall transport system	X-value	After replacing the cylinder	Tension/torque	Remarks
1	Tension cassette (back-tension meter)			▨				▨				
2	Alignment tape 48HMP-2-1					▨	▨	▨	▨	▨		
3	(MH-1)					▨	▨					
4	24HMASF-2											
5	Master plane		▨		▨	▨	▨					
6	Reel height jig		▨		▨	▨	▨					
7	Torque gauge										▨	
8	Torque gauge adapter										▨	
9	Hexagonal wrench					▨	▨			▨		
10	Flat bladed screwdriver			▨				▨	▨	▨		
11	Box screwdriver				▨		▨	▨				
12	Philips screwdriver			▨			▨	▨				
13	VHS blank tape	▨			▨		▨			▨		
14	S-VHS blank tape							▨				
15	Extension P.C.B(4 pins)					▨		▨	▨	▨		
16	Extension P.C.B(3 pins)											
17	14-pin test cable											
18	Oscilloscope					▨	▨		▨	▨		
19												
20												

1. MECHANICAL COMPONENTS ADJUSTMENT

1-1. Mechanism State Switch Adjustment

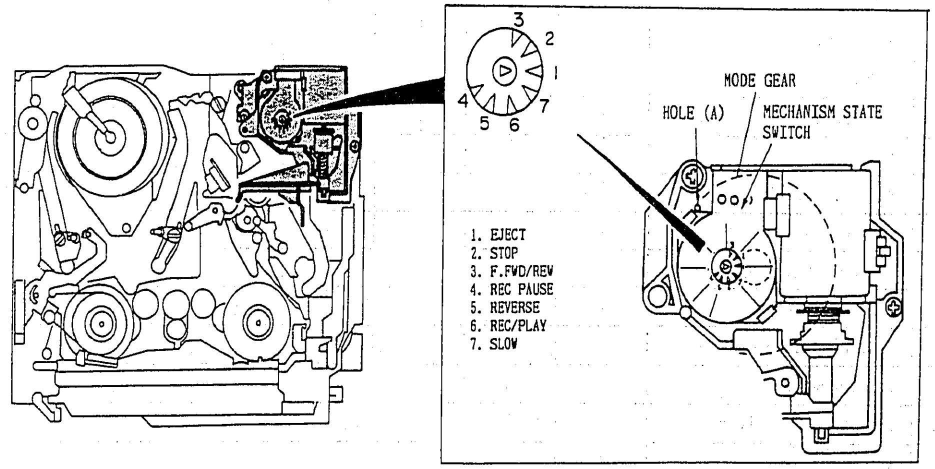
Purpose: To detect the mechanism state correctly and prevent malfunctions.

Test equipment/Jig	State of VCR	Adjustment Points
• Blank tape	• EJECT mode Set to the state in which the cassette is ejected.	• Mechanism state switch • Mode gear

Adjustment Procedure

1) Check that the arrow on the center axis of the switch points in the direction of the mechanism mode 1 arrow. Also check that hole (A) beside the switch and the hole in the mode gear are aligned.
2) If the above alignments are not obtained, perform adjustment by the following procedure.
   1. Remove the mechanism state switch/loading motor assembly. (See item 6 of Main Mechanical Components Removal in CHAPTER 2)
   2. Move the mode gear to align its hole with hole (A).
   3. Turn the gear at the back of the switch so the arrow on the center shaft points in the direction of the mechanism mode 1 arrow.
   4. Reinstall the mechanism state switch/loading motor assembly in this state.
3) Load a blank tape and perform each operation. Check that loading and unloading are performed quickly.

Adjustment Diagram



2. TAPE TRANSPORT SYSTEM COMPONENTS ADJUSTMENT

The tape transport system is the path from the supply reel disk passing the video heads to the take-up reel disk. The transport system components, especially the components, which directly come into contact with tape, should be kept clean without scratches, dust, oil, etc.

The tape transport system has been adjusted before the unit is shipped from the factory. Therefore, when components in the transport system are replaced, the transport system is stabilized by only adjusting the new components correctly.

2-1. Reel Disk Height Adjustment

Purpose: To set the reels of the cassette to the specified height, thus determining the height of tape.

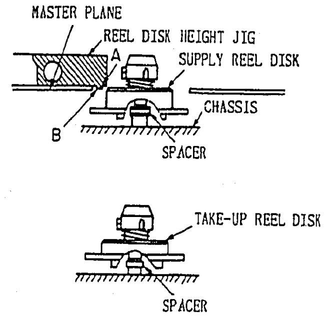
Test equipment/Jigs	State of VCR	Adjustment Points
• Master plane • Reel disk height jig	• Remove the cassette loading mechanism. • Mount the master plane and the reel disk height jig on it.	• Spacers on the supply and take-up reel disk shafts

Adjustment Procedure

1) Check that the reel disk is between sections A and B of the reel disk height jig.
2) If the disk is not between sections A and B of the jig, replace the spacers (two types, 0.25mm and 0.5mm thick) on the reel disk shaft or adjust them.

(Caution)
When the tension arm and tension band removed to perform this adjustment, adjust the tension pole position and tension after reinstalling them.

Adjustment Diagram



2-2. Tension Pole position and Tension Adjustment

Purpose: To make the tension of the tape constant so the contact between the video heads and tape is is stabilized.

Test equipment/Jigs	State of VCR	Adjustment Points
Position Adjustment • Flat bladed screwdriver	1) Remove the top cover. 2) Set the VCR to the loading state without inserting a cassette. (See page 4-2)	Position Adjustment : Tension band holder
Tension Adjustment • Tension cassette	Tension Adjustment 3) Play the tension cassette.	Tension Adjustment : Tension spring hooking position

Adjustment Procedure

—Position Adjustment—

1) Insert a flat bladed screwdriver into the groove for adjusting the tension pole position and move it so the gap between the tension arm and chassis is -0.5~2mm.
2) After adjustment, perform loading without inserting a cassette and re-check the tension pole position.

—Tension Adjustment—

Reading of tension cassette : 33~44g-cm (reference value)

If the reading is higher than the reference value, move the spring in direction (A).

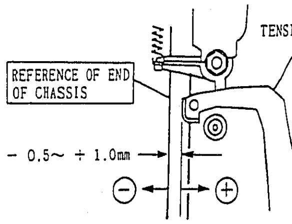
If the reading is lower than the reference value, move the spring in direction (B).

(Caution)

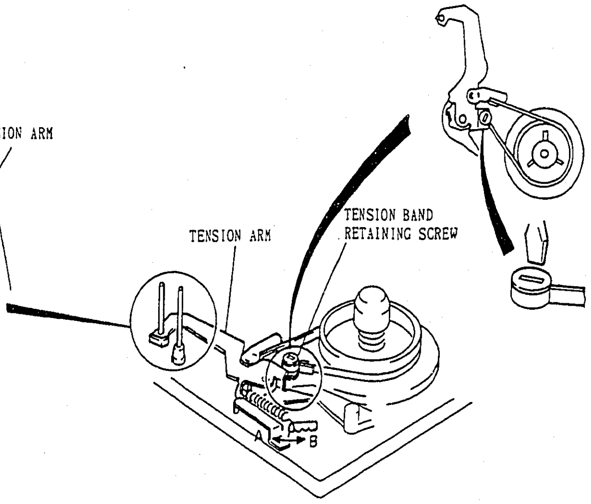
When the tension is changed greatly (6g-cm or more), re-check the tension pole position. If it is drifted, readjust the tension pole position and tension.

Adjustment Diagram

[POSITION ADJUSTMENT]


TENSION ARM
REFERENCE OF END OF CHASSIS
- 0.5~ + 1.0mm
⊖
⊕

[TENSION ADJUSTMENT]


TENSION ARM
TENSION BAND RETAINING SCREW
A
B

2-3. Guide Pole Height Adjustment

Purpose: To regulate the height of the tape.

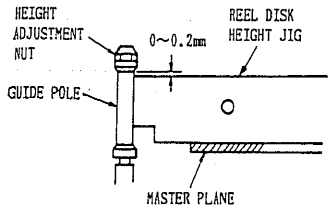
Test equipment/Jigs	State of VCR	Adjustment Points
• Master plane • Reel disk height jig	1) Remove the cassette loading mechanism. 2) Mount the master plane and place the reel disk height jig on it.	• Height adjustments nuts on the supply and take-up guide poles
• Blank tape	Playback mode	

Adjustment Procedure

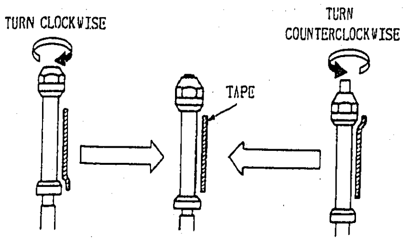
1) Set the clearance between the bottom of the guide pole's upper flange and the top of the reel disk height jig to 0 to 0.2mm.
2) Load a blank tape, let it run and check that the tape does not ride over the upper and lower flanges of the guide pole.
3) If the tape rides over either flange, adjust the height of the guide pole.
   If the tape rides over the upper flange, turn the nut counterclockwise.
   If the tape rides over the lower flange, turn the nut clockwise.

Adjustment Diagram

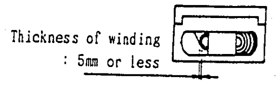
[COARSE ADJUSTMENT]


HEIGHT ADJUSTMENT NUT
0~0.2mm
REEL DISK HEIGHT JIG
GUIDE POLE
MASTER PLANE

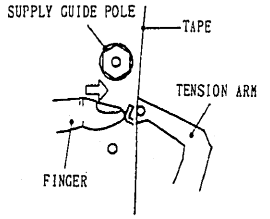
[PRECISE ADJUSTMENT]
Take-up guide pole


TURN CLOCKWISE
TURN COUNTERCLOCKWISE
TAPE

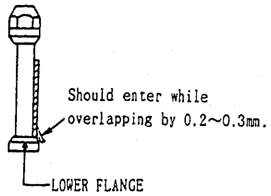
Supply guide pole
- Tape used : End of Hitachi/Maxell T-120 tape


Thickness of winding : 5mm or less

- VCR mode : PLAY
- Push the tension arm inward with your finger as shown in the figure below to release the tape from the supply guide pole.


SUPPLY GUIDE POLE
TAPE
TENSION ARM
FINGER

- Release your finger gently. Check that the tape enters the guide while its edge overlaps the lower flange by 0.2~0.3mm as shown in the figure below.


Should enter while overlapping by 0.2~0.3mm.
LOWER FLANGE

- Check that the bottom edge of tape always runs along the lower flange.
- Check that there is no curling when the tape is running.

2-4. Guide Roller Height Adjustment

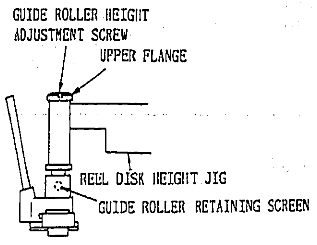
Purpose: To regulate the height of the tape so the bottom of the tape runs along the tape guide line on the cylinder.

Test equipment/Jigs	State of VCR	Adjustment Points
• Master plane • Reel disk height jig • Hexagonal wrench	1) Remove the cassette loading mechanism. 2) Mount the master plane and place the reel disk height jig on it.	• Height adjustment screws on the supply and take-up guide rollers

Adjustment Procedure

1) Loosen the guide roller retaining screw (so that the guide roller does not turn during loading, unloading and play).
2) Align the bottom of the guide roller's upper flange and the top of the reel disk height jig.
3) Perform the precise adjustment continuously.

Adjustment Diagram


GUIDE ROLLER HEIGHT
ADJUSTMENT SCREW
UPPER FLANGE
REEL DISK HEIGHT JIG
GUIDE ROLLER RETAINING SCREEN

Precise Adjustment

Test equipment/Jigs	Test Equipment Connection Points	State of VCR	Adjustment Points
• Oscilloscope	• CH-1 : TP206 • CH-2 : TP208	• Play the alignment tape.	• Guide roller height Adjustment
• Alignment tape(48HMP-2-1) • Hexagonal wrench			

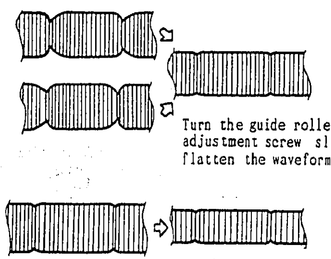
Connection Diagram

See page 4-2 for the connection of test equipment.

Adjustment Procedure

1) Tracking control (playback): Set to the center. (When this adjustment is performed after the cylinder has been replaced, set the tracking control so the FM output is maximum.)
2) Height adjustment screw : Flatten the FM output waveform.
3) Turn the tracking control (playback) clockwise and counterclockwise.
4) Check that the gradients with which FM output drops uniform at the start and end.
5) Tighten the guide roller retaining screw.

Waveform Diagram



Turn the guide roller height adjustment screw slightly to flatten the waveform.

Set the tracking cntrol to the center.

Turn the tracking control in both directions.

2-5. Audio/Control (A/C) Head Adjustment

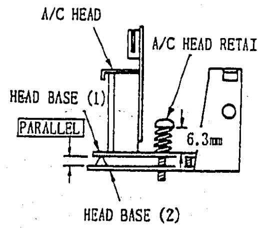
Purpose: To keep the contact between the tape and heads even so the specified tracks are recorded and played back.

Coarse Adjustment

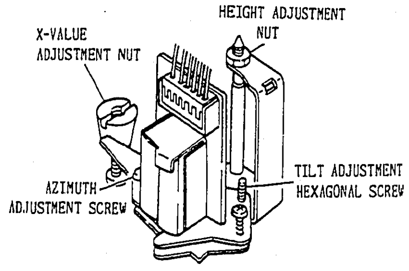
Test equipment/Jigs	State of VCR	Adjustment Points
• Master plane • Reel disk height jig • Hexagonal wrench	1) Remove the cassette loading mechanism. 2) Mount the master plane.	• A/C head retaining screw • Azimuth adjustment screw • Height adjustment nut • Tilt adjustment hexagonal screw
• Blank tape	• Play blank tape.	

Adjustment Procedure / Adjustment Diagram

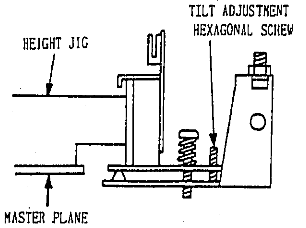
1) A/C head retaining screw : Check that the spring section of this screw protrudes 6.3mm over the top of head base (1).


A/C HEAD
A/C HEAD RETAINING SCREEN
HEAD BASE (1)
PARALLEL
6.3mm
HEAD BASE (2)

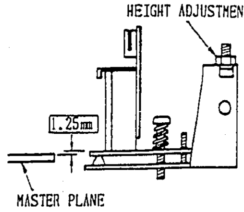
2) Tilt adjustment hexagonal screw and azimuth adjustment screw : Make head bases (1) and (2) parallel.


HEIGHT ADJUSTMENT NUT
X-VALUE ADJUSTMENT NUT
TILT ADJUSTMENT HEXAGONAL SCREW
AZIMUTH ADJUSTMENT SCREW

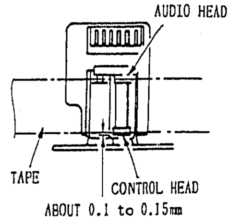
3) Tilt adjustment hexagonal screw: Place the reel disk height jig on the master plane and make the A/C head surface and vertical surface of the jig parallel.


TILT ADJUSTMENT HEXAGONAL SCREW
HEIGHT JIG
MASTER PLANE

4) Height adjustment nut : Set the clearance between the master plane and head base (1) to 1.25mm.


HEIGHT ADJUSTMENT NUT
1.25mm
MASTER PLANE

5) Remove the adjustment jig, load a blank tape and set the VCR to the play mode.
6) Check that there is no conspicuous curling or riding over around the A/C head. If there is conspicuous curling or riding over, readjust the tilt adjustment hexagonal screw, azimuth adjustment screw and height adjustment nut. When the bottom edge of the tape is 0.1 to 0.15mm from the bottom edge of the control head's core, the height of the A/C head is ideal.


AUDIO HEAD
TAPE
CONTROL HEAD
ABOUT 0.1 to 0.15mm

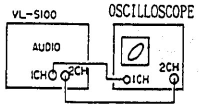
7) Perform the precise adjustment continuously.

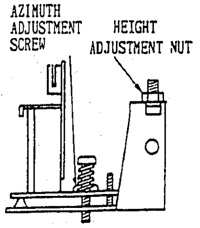
Precise Adjustment

Test equipment/Jigs	Test Equipment Connection Points	State of VCR	Adjustment Points
• Oscilloscope • Alignment tape (48HMP-2-1 or MH-1) • Hexagonal wrench	• AUDIO OUT jack	• Play alignment tape (7kHz section of 48HMP-2-1 or MH-1)	• Azimuth adjustment screw • Height adjustment screw

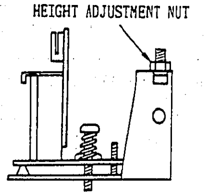
Adjustment Procedure

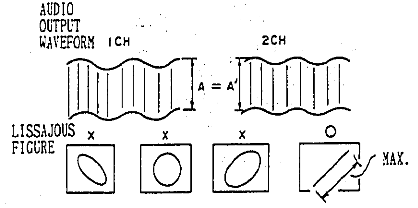
1) Height Adjustment
   While observing the two level meters on the front panel, turn the height adjustment nut of the A/C head and adjust so the pointers of both meters indicate the maximum values and then the pointer of the left meter is deviated slightly from the maximum.
2) Azimuth Adjustment
   Adjust the oscilloscope so the CH-1 and CH-2 audio output waveforms are the same. Make a Lisaajous figure using the X-Y position on the oscilloscope and adjust the azimuth adjustment screw so the figure is inclined to the top right by 45° obliquely from the maximum.


VL-S100
OSCILLOSCOPE
AUDIO
1CH
2CH
1CH
2CH


AZIMUTH ADJUSTMENT SCREW
HEIGHT ADJUSTMENT NUT

Waveform Diagram


HEIGHT ADJUSTMENT NUT


AUDIO OUTPUT WAVEFORM
1CH
2CH
A = A'
LISSAJOUS FIGURE
X
X
X
O
MAX.

2-6. Transport Component Overall Adjustment

Purpose

If, when a tape recorded by the same VCR is played back, the video head output waveform (FM envelope) on the supply side drops, the output of vertical sync signal is low and the picture shakes up and down, adjust by the following procedure.

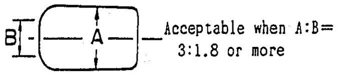
When the tape transport system parts such as the cylinder, guide rollers, etc. are replaced, also perform the following adjustments and checks.

Adjustment jigs

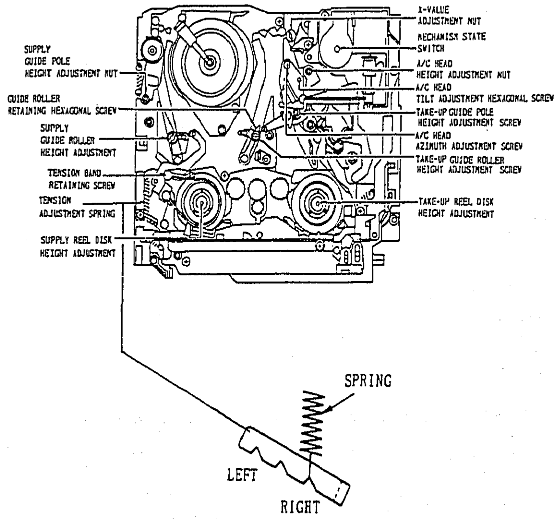
- Flat bladed screwdriver for adjusting the guide rollers
- Box screwdriver for adjusting the supply guide pole
- Philips screwdriver for adjusting the tension band holder
- Tension cassette (Tonichi or tension cassette)
- Alignment tape : 48HMP-2-1
- Blank tape : S-VHS tape (Hitachi/Maxell T-120)

Adjustment procedure

1. Checking the envelope during recording and playback
   - T-120 tape : Use the tape in the range of 400~1000 counting from its start to avoid the effect of tape winding.
   - Type of tape : Use a Hitachi/Maxell S-VHS tape

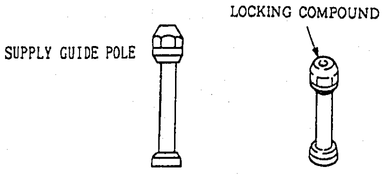

B
A
Acceptable when A:B= 3:1.8 or more

2. Replacement of tension adjustment spring
   Replace the tension adjustment spring as shown in the figure below.


SUPPLY GUIDE POLE HEIGHT ADJUSTMENT NUT
GUIDE ROLLER RETAINING HEXAGONAL SCREW
SUPPLY GUIDE ROLLER HEIGHT ADJUSTMENT
TENSION BAND RETAINING SCREW
TENSION ADJUSTMENT SPRING
SUPPLY REEL DISK HEIGHT ADJUSTMENT
X-VALUE ADJUSTMENT NUT
MECHANISM STATE SWITCH
A/C HEAD HEIGHT ADJUSTMENT NUT
A/C HEAD TILT ADJUSTMENT HEXAGONAL SCREW
TAKE-UP GUIDE POLE HEIGHT ADJUSTMENT SCREW
A/C HEAD AZIMUTH ADJUSTMENT SCREW
TAKE-UP GUIDE ROLLER HEIGHT ADJUSTMENT SCREW
TAKE-UP REEL DISK HEIGHT ADJUSTMENT
SPRING
LEFT
RIGHT

Note: Hook the spring onto the right recess of the chassis hook section.

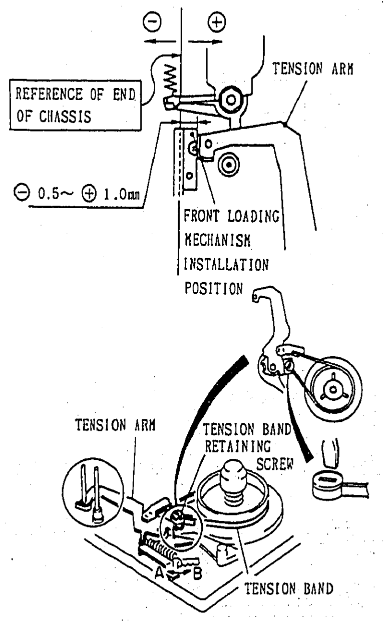
3. Supply guide pole


LOCKING COMPOUND
SUPPLY GUIDE POLE

∘ When the supply guide pole is loose, coat the top of the nut with a small amount of screw locking compound. (Be carefull that the compound does not adhere to the tape transport system.)

4. Checking the tension pole position

Perform loading without inserting a cassette and check that the clearance between the end of the tension arm and the end of the chassis is -0.5 to +1.0mm.


⊖
⊕
TENSION ARM
REFERENCE OF END OF CHASSIS
⊖ 0.5~ ⊕ 1.0mm
FRONT LOADING MECHANISM INSTALLATION POSITION
TENSION ARM
TENSION BAND RETAINING SCREW
A
B
TENSION BAND

If the clearance is out of the range of -0.5 to +1.0mm, loosen the tension band retaining screw and move the tension band holder to one of grooves 1, 2 and 3, and then tighten the retaining screw.

(To perform loading without inserting a cassette)

① Shut off the DC input.

② Cover the end LED (at the center of the chassis) with a black cap (for example, the cap of a ball-point pen) to shut off the light.
When the VCR malfunctions due to light, also cover the supply and take-up end sensors with black masking tape to shut off the light.

③ Supply a DC input.

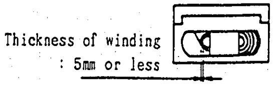
④ Turn the power switch on.

⑤ Press the PLAY button to perform loading without a cassette.

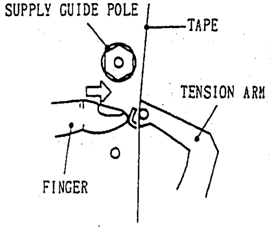
(To release loading without a cassette)

Press the STOP button to set the VCR to the stop mode.
Remove the cap and masking tape.
Shut off the DC input to reset the microprocessor.
Supply a DC input again and turn the POWER switch on.
The VCR enters the normal state.

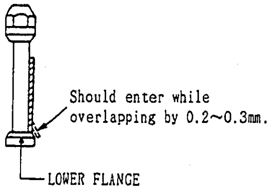
5. Supply guide pole height adjustment
- Tape used : End of Hitachi/Maxell T-120 tape



- VCR mode : PLAY
- Push the tension arm inward with your finger as shown in the figure below to release the tape from the supply guide pole.



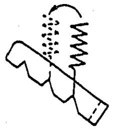
- Release your finger gently. Check that the tape enters the guide while its edge overlaps the lower flange by 0.2~0.3mm as shown in the figure below.



- Check that the bottom edge of tape always runs along the lower flange.
- Check that there is no curling when the tape is runnng.

6. Checking the tension value

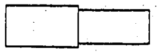
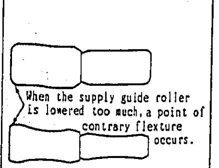
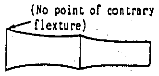
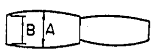
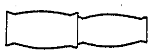
Play a tension cassette and check the tension.
- Tension cassette : Tonichi tension cassette
- Criterion standard : 34~44 g-cm
If the measured tension is higher than the standard, move the spring to the center hooking position.



7. Guide roller height adjustment

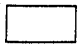
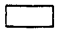
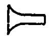
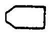
Play the alignment tape (48HMP-2), and while observing the FM output waveform, adjust the height of the guide roller.

Adjusting the supply guide roller
1. Lower the guide roller (turn it clock-wise) until the FM output waveform on the supply side drops.
2. Raise the guide roller gradually and stop it immediately before the swelling of the output waveform on the supply side becomes round when the tracking control is turned to the right.

		Good example	Bad example
Tracking control	Preset		 When the supply guide roller is lowered too much, a point of contrary flexture occurs.
	To the right	 (No point of contrary flexture)	
	To the left		
Note		After the above adjustment, the flatness should be A:B=3:1.6 or more	If the guide roller is lowered too much, the above waveform appears.

8. Checking the recording/playback FM envelopes

Record and playback using the same VCR in the state that the test mode is released.
- Condition : Same as that in step 1
- Turn the tracking control to the left and right and check that the envelope becomes thin on average.

PRESET	TRACKING CONTROL TURNED TO THE LEFT OR RIGHT		
	 OK	 NG	 NG

If the result is bad, recheck the height of the supply guide pole and readjust it (step 5).

2-7. X-Value Adjustment

Purpose: To obtain compatibility with other VCRs.
Note: Be sure to perform the tracking preset adjustment before adjusting the X-value.

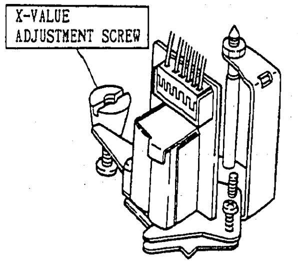
Test equipment/Jigs	Test Equipment Connection Points	State of VCR	Adjustment Points
· Oscilloscope	· CH-1 : TP206 · CH-2 : TP208	· Play the alignment tape	· X-value adjustment screw
· Alignment tape (48HMP-2-1 or MH-1) · Flat bladed screwdriver			

Connection Diagram

Connect equipment as shown on page 4-2.

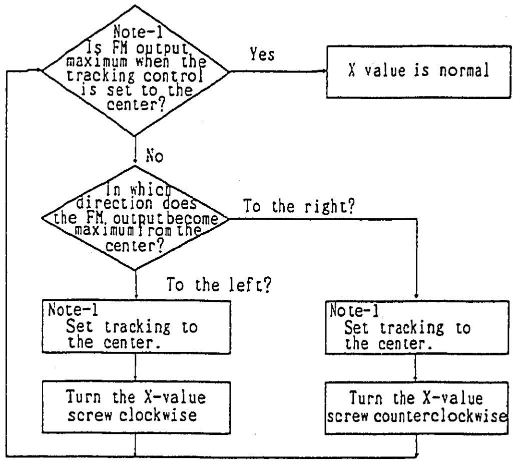
Caution on adjustment

Note-1 : When the tracking control is set to the center position, the tracking is centered.

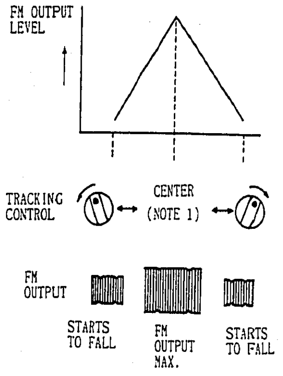

X-VALUE
ADJUSTMENT SCREW

Adjustment Procedure

[Adjustment using alignment tape 48HMP-2-1]
Adjust so the FM output is maximum when the tracking control is set to the center position.

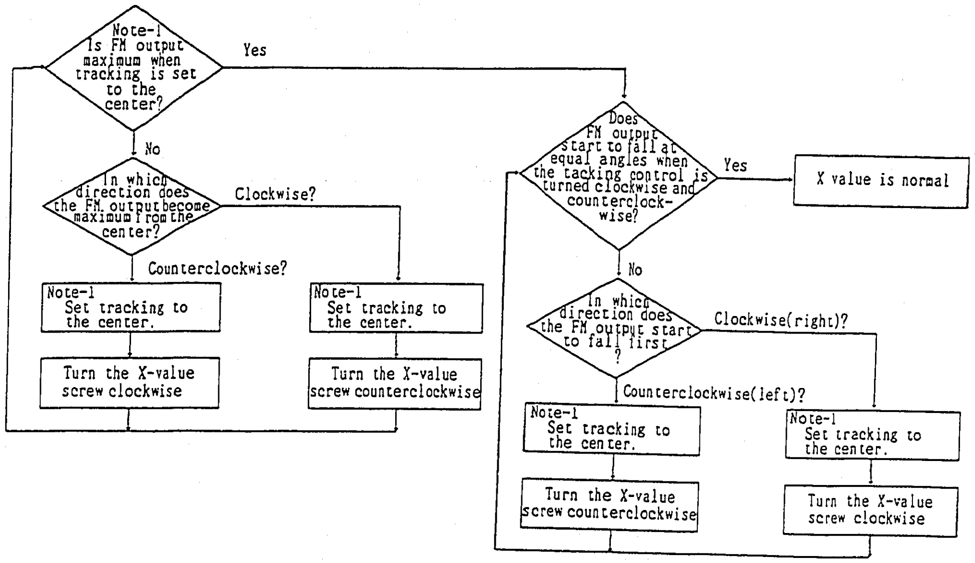

Note-1
Is FM output maximum when the tracking control is set to the center?
Yes
X value is normal
No
In which direction does the FM output become maximum from the center?
To the right?
To the left?
Note-1
Set tracking to the center.
Note-1
Set tracking to the center.
Turn the X-value screw clockwise
Turn the X-value screw counterclockwise

Adjustment Diagram

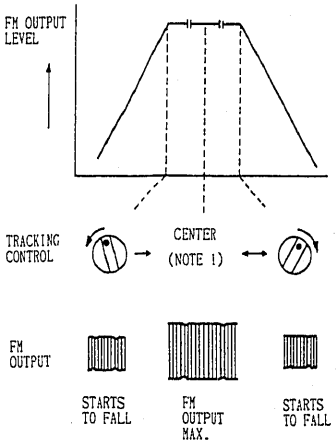


Adjustment Procedure

[Adjustment using alignment tape MH-1 (58μm)]
Adjust so the FM output is maximum when the tracking control is set to the center and starts to fall at equal angles when the control is turned to the left and right.


Note-1
Is FM output maximum when tracking is set to the center?
Yes
No
In which direction does the FM output become maximum from the center?
Clockwise?
Counterclockwise?
Note-1
Set tracking to the center.
Note-1
Set tracking to the center.
Turn the X-value screw clockwise
Turn the X-value screw counterclockwise
Does FM output start to fall at equal angles when the tacking control is turned clockwise and counterclockwise?
Yes
X value is normal
No
In which direction does the FM output start to fall first?
Clockwise(right)?
Counterclockwise(left)?
Note-1
Set tracking to the center.
Note-1
Set tracking to the center.
Turn the X-value screw counterclockwise
Turn the X-value screw clockwise

Adjustment Diagram



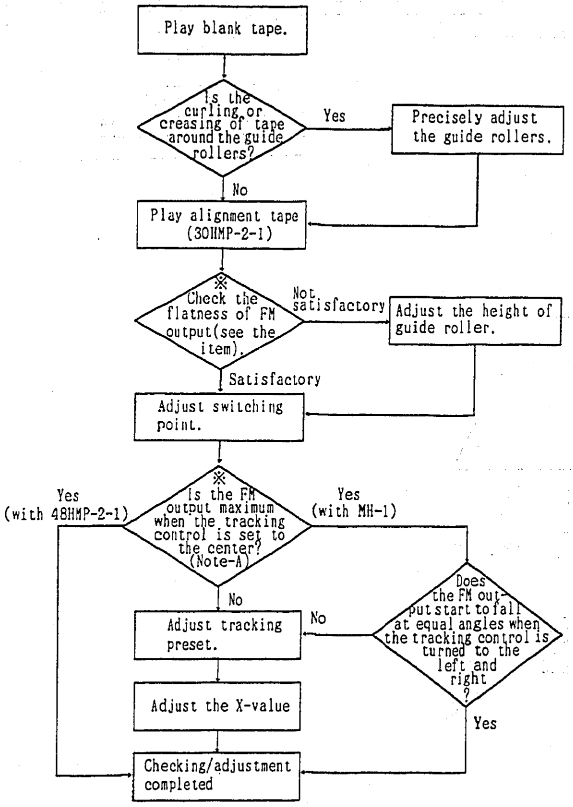
2-8. Adjustment after Replacing Cylinder (Video Heads)

Purpose: To suppress drift in the height of the cylinder relative to the guide roller and drift of of the X-value, etc.
However, the drift is very small when the cylinder is replaced correctly.

Test equipment/Jigs	Test Equipment Connection Points	State of VCR	Adjustment Points
· Oscilloscope	· CH-1 : TP206 · CH-2 : TP208	· Play blank tape. · Play alignment tape.	· Guide roller (precise adjustment on page 4-8) · Switching point (page 3-2) · Tracking preset (page 3-3) · X-value (page 4-14)
· Alignment tape (48HMP-2-1) · Blank tape · Hexagonal wrench · X-value adjustment screwdriver	–		

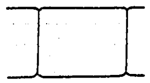
Checking / Adjustment Procedure
When checking the items marked ※, connect test equipment, referring to the connection diagram on page 4-2.

Note-A : Set the tracking control to the center position to center the tracking.

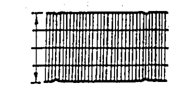

Play blank tape.
Is the curling or creasing of tape around the guide rollers?
Yes
Precisely adjust the guide rollers.
No
Play alignment tape (30HMP-2-1)
※ Check the flatness of FM output(see the item).
Not satisfactory
Adjust the height of guide roller.
Satisfactory
Adjust switching point.
※ Is the FM output maximum when the tracking control is set to the center? (Note-A)
Yes (with 48HMP-2-1)
Yes (with MH-1)
No
Adjust tracking preset.
Does the FM output start to fall at equal angles when the tracking control is turned to the left and right ?
No
Yes
Adjust the X-value
Checking/adjustment completed

Checking procedure of flatness and fluctuations of FM output and waveform diagrams

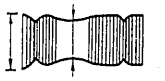
1) Use the tracking control to maximize the FM output.



2) Fine tune the voltage level range of the oscilloscope to set the FM output to 4 graduations.


4 GRADUATIONS

3) Turn the tracking control to set the maximum amplitude of the FM output to 3 graduations.
4) Check that the minimum amplitude is more than 2 graduations.


3 GRADUATIONS
2 GRADUATIONS

5) Check that the level fluctuations between the maximum and minimum amplitudes are less than 13%.

2-9. Tension / Torque Checks

Purpose: It is necessary to check the tension, torque, and compression force at the tape take-up section and movable sections to make tape running smooth and satisfy the basic performance of the VCR. Check these if the tape running is not smooth or the tape speed is abnormal.

Test equipment/Jigs	State of VCR
· Torque gauge · Torque gauge adapter	· Set the VCR to each operation mode without inserting a cassette. (See page 4-2)

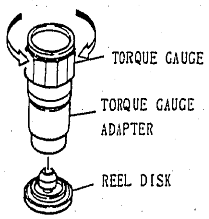
Item	VCR operation mode	Measured reel	Measurement value	Remakrs
Main brake torque	Note-1	Supply and take-up reels	100 g·cm or more	Note-2
Slack removal torque	Unloading	Supply reel	220～320g·cm	
Fast forward torque	Fast forward	Take-up reel	600 g·cm or more	
Rewing torque	Rewind	Supply reel	600 g·cm or more	
Take-up torque	Play	Take-up reel	150～250g·cm	
Back-tension torque	Fast forward Rewind	Supply reel Take-up reel	4～25 g·cm	Note-2

Checking Medthod
Cover the both supply and take-up end sensors with paper etc., and set the VCR to the loading mode without a cassette tape.
Then, confirm the each torque under this condition.
The value are measured using a torque gauge and torque gauge adapter with the torque gauge fixed.

Note-1 : Set the VCR to the F.Fwd/Rewind mode while turning the loading motor by hand. Then, turn the loading motor in the reverse to activate the main brake. This is the condition that the main brake is operating.

Note-2 : This value is measured immediately after braking is applied to the reel disks when the fast forward or rewind mode is switched to the stop mode.

Adjustment Diagram


TORQUE GAUGE
TORQUE GAUGE ADAPTER
REEL DISK

MAINTENANCE/INSPECTION PROCEDURE

1. Required Maintenance

The recording density of a VCR is much higher than that of an audio tape recorder. VCR components must be very precise, at tolerances of 1/1000mm, to ensure compatible with other VCRs. If any of these components are worn or dirty, the symptoms will be the same as if the part is defective. To ensure good picture, periodic inspection and maintenance, including replacement of worn-out parts and lubrication, is necessary.

2. Scheduled Maintenance

Schedules for maintenance and inspection are not fixed because they vary greatly according to the way in which the customer uses the VCR, and the environment in which the VCR is used. But, in general home use, a good picture will be maintained if the inspection and maintenance is made every 1,000 hours. The table below shows the relation between time used and inspection period.

Table 1

When inspection is necessary / Average hours used per day	About 1 year	About 18 months	About 3 years
One hour	▨	▨	▨
Two hours	▨	▨	
Three hours	▨		

3. Check before starting Repairs

The following faults can be remedied by cleaning and oiling. Check the need for lubrication and the conditions of cleanliness in the unit. Check with the customer to find out how often the unit is used. If from that, you determine that the unit is ready for inspection and maintenance, check the following parts.

Table 2

Phenomenon	Inspection Location
Poor S/N, no color	Dirt on video head or worn video head
Tape does not run or tape is slack	Dirt on pressure roller, reel belt or flywheel belt
Vertical jitter, horizontal jitter	Dirt on video head or in tape transport system
Colour beats	Dirt on full-erase head
Low volume or sound distorted	Dirt on audio/control head
Fast forward or rewind is not done or rotation is slow	Dirt on reel belt

4. Tools Needed for Inspection and Maintenance

(1) Head cleaning stick
(2) VCR oil kit
(3) Alcohol (or freon)
(4) Gauze
(5) Screwdriver for adjusting X-value

Table 3 Locations for greasing and Oiling using the Kit

Name	Oil or Greasing Location
Pan motor oil (X10W40)	Oil high-speed rotating sections
Sonic Slidas Oil (#1600)	Oil low-speed rotating sections
Hitazol (M0138)	Grease metal parts under heavy load
Froil (GB-TS-1)	Lubricate metal or molded sections under light load
Lock paint	Fix adjustment screws

The above oils and greases are in the kit prepared especially for VCR maintenance. Use this kit for lubrication.

5. Maintenance Procedures

5-1. Cleaning

(1) Cleaning video head
First use a cleaning tape. If dirt on head is too stubborn to remove by tape, use the head cleaning kit. Coat the cleaning stick with cleaning fluid to the point indicated. Touch the stick to the head tip and gently turn the head (rotating cylinder) to the right and left. (Do not move the stick vertically and make sure that only the buckskin on the stick comes into contact with the head. Otherwise, the head may be damaged.) Thoroughly dry the head. Then test run a tape. If cleaning fluid remains on the video head, the tape may be damaged when it comes into contact with the head surface.

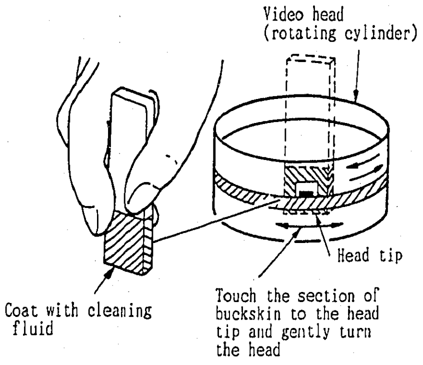
(2) Cleaning the tape transport system and drive system, etc.
Wipe with gauze wetted with alcohol or freon.
Note:
① The tape transport system is the system which comes into contact with the running tape. The drive system consists of those parts which run the tape.
② Make sure that during cleaning you do not touch the tape transport system with the tip of a screwdriver and that no force is applied to the system that would cause deforming.

5-2. Lubrication

(1) Guidelines for lubricating with oil
Use the oiler to apply one or two drop of pan motor oil or Sonic Slidas oil. Make sure not to use too much oil because it may spill over or leak out coming in contact with rotating parts and causing slippage or other problems. If too much oil is applied, wipe clean with alcohol of freon.
(2) Periodic oil lubrication
Oil at specified locations every 1,000 hours.

5-3. Greasing

(1) Greasing guidelines
Apply grease, Hitazol or Froil, with a stick or brush. Do not use excess grease. It may come into contact with the tape transport or drive system. Wipe any excess and clean with gauze wetted in alcohol or freon.
(2) Periodic greasing
Grease specified locations every 5,000 hours.


Video head
(rotating cylinder)
Head tip
Coat with cleaning fluid
Touch the section of buckskin to the head tip and gently turn the head

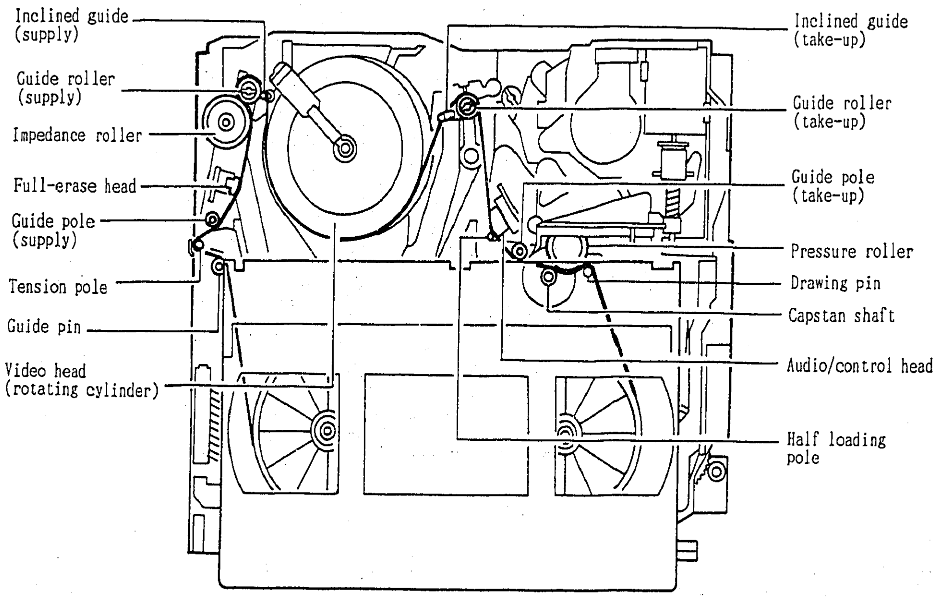
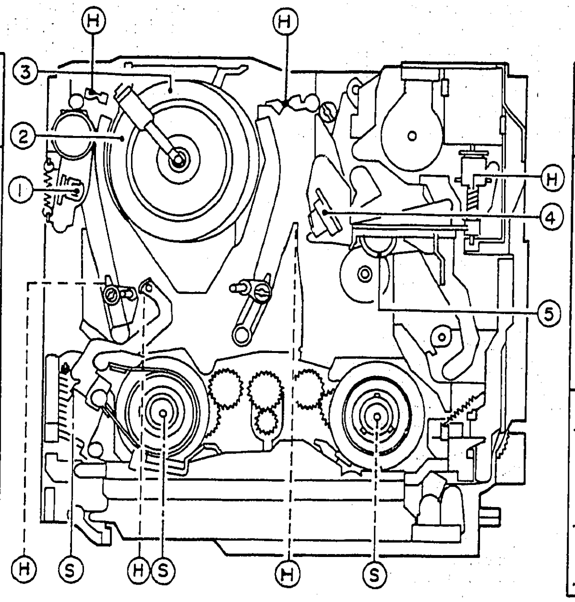


Fig.1 Tape Transport System

6. Inspection Locations

	Phenomenon	Inspection Location	Repla-cement
①	Color betats	Dirt on full erase head	
②	Poor S/N, no color	Dirt on video heads	○
③	Vertical jitter	Dirt on video heads Dirt in tape transport system	



	Phenomenon	Inspection Location	Repla-cement
④	Low volume, sound disordered	Dirt on audio/control head	○
⑤	Tape does not run. Tape is slack.	Dirt on pressure roller	○

Fig.2 Top View of Mechanism

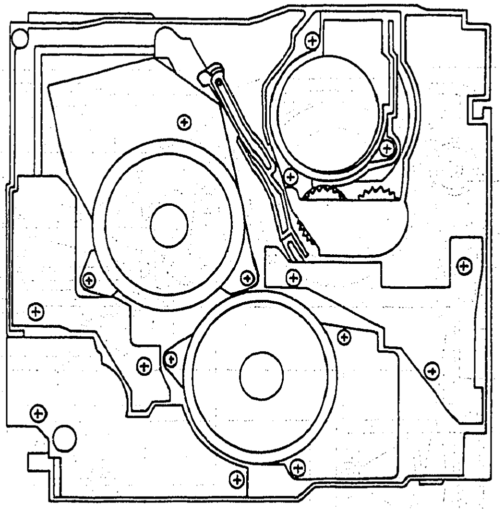


Fig.3 Bottom View of Mechanism

Note: If locations marked with ○ do not operate normally after cleaning, they are worn. Replace.
See the EXPLODED VIEWS at the end of this manual as well as the above illustrations for the sections to be lubricated and greased.

Ⓢ Sonic slider oil (# 1600)
Ⓗ Froil (G-31SAY)

INSPECTION PROCEDURE

○ : Replace ☒ : Lubricate
▽ : Clean (Check the time of use from the telmo-timer of the VCR)

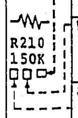
Index No.	Description	Parts No.	1000H	2000H	3000H	4000H
210	Supply reel disk	VL-S100 051	☒ ▽	☒ ▽	○	☒ ▽
212	Take-up reel disk	VL-S100 052	☒ ▽	☒ ▽	○	☒ ▽
228	Tension arm assembly	VT-S625 051	▽	▽	▽	▽
227	Tension band	VT-S625 044		○		○
219	Supply inclined guide	VT-Z50 077	▽	▽	▽	▽
221	Take-up inclined guide	VT-F410 044	▽	▽	▽	▽
220	Supply guide roller	VT-Z50 078	▽	▽	▽	▽
220	Take-up guide roller (Take-up)	VT-Z50 078	▽	▽	▽	▽
225, 255	Tape guides	VT-Z40 024	▽	▽	▽	▽
224	Impedance roller assembly	VT-Z35 007	▽	▽	▽	▽
223	Full erase head	VT-F410 045	▽	▽	▽	▽
204	Audio/control head (A·CE head)	VL-S100 048	▽	▽	▽	○
208	Capstan motor brake	VL-S100 049	▽	○	▽	○
301	Capstan motor assembly	VL-S100 074		○		○
214	Pressure roller assembly	VL-S100 054	▽	○	▽	○
244	Loading motor assembly	VT-Z50 099		○		○
501	Cylinder assembly	VL-S100 096	(○)	(○)	(○)	(○)
303	Reel motor assembly	VL-S100 076		○		○
263, 264	Relay gears	VL-S100 069 VL-S100 171	▽ ☒	▽ ☒	○	▽ ☒
258	FR arm assembly	VL-S100 065	▽	○	▽	○
272	Brake pad (of slider block)	VL-S100 182	▽	○	▽	○
273	Brake pad (of subbrake)	VL-S100 183	▽	○	▽	○
274	Brake pad (of tension brake)	VL-S100 184	▽	○	▽	○

SCHEMATIC/CIRCUIT BOARD DIAGRAMS

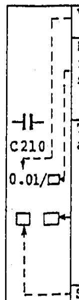
BEFORE USING THIS SERVICE REFERENCE MATERIAL

How to read abbreviations

(Resistors)

	Value	Not indicated .. Ω(ohm) K .... kΩ
	Toler-ance	Not indicated .. ±5% K .... ±10% M .... ±20%
	Wattage	Not indicated .. 1/8W (All values other than 1/8W are indicated in the schematic diagrams with W omitted)
	Sort	Not indicated .. Carbon film RC .... Carbon solid RW .... Wire wound RS .... Metal oxide film RN .... Metal film
Example:	R120 ..... 150kohm, carbon solid RC1/2K 1/2W, +10%	

(Capacitors)

	Value	Not indicated .. μF P .... PF
	Dielect-ric strength	Not indicated .. 50WV (All values other than 50WV and electrolytic capacitors are indicated in the schematic diagrams with WV omitted)
	Toler-ance	Not indicated .. ±10% J .... ±5% M .... ±20% C .... ±0.25PF Z .... +80% -20% (No tolerance is indicated for electrolytic capacitors (excluding tantalum and high stability electrolytic capacitors))
	Sort	Not indicated .. Ceramic General electrolytic (distinguished from ceramic with circuit symbol) MYL .... Mylar (polyester film) STY .... Styrol TA .... Tantalum KU .... High stability electrolytic MP .... Metalized paper
Example:	⊣⊢ C210 0.01/25 ... Mylar, 0.01μF, 25WV, ±5% MYL J	

Notes:

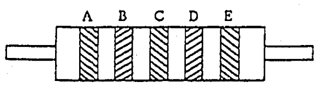
1. Voltages are measured with the negative ⊖ terminal of the power supply as reference in the normal operating mode. The voltages in different modes are indicated in the schematic diagrams; those in parentheses ( ) are in the record mode and those without parentheses are in the play mode.
2. The value, dielectric strength (wattage), tolerance and sort of resistors (excluding variable resistors, etc.) and capacitors are indicated in the schematic diagrams by abbreviations. Replace them correctly, comparing the abbreviations in the schematic diagrams and the table "how to read abbreviations".

Cautions on use of MOS IC

1. The MOS IC is inserted in black foam for shipment. This foam is a conductor which short-circuits between the leads to prevent damage. Do not remove ICs from this foam during their storage. Avoid removing ICs from this foam placing them on plastic which is likely to be charged with static electricity or inserting them into styrol foam.
2. High voltages may be applied during soldering caused by leakages from the soldering iron, so be sure to ground the tip of the soldering iron or use a low voltage soldering iron.
3. The human body, clothes made of synthetic fibers or nylon gloves may be charged with several thousands volts of static electricity because of friction, so a worker should be grounded.
4. Be sure to ground measuring instruments such as oscilloscopes, VTVMs, etc. used for repairs.

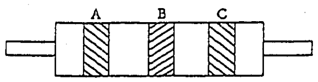
How to read capacity and inductance of resistor shape capacitors and coils

CAPACITOR



CAPACITY: (10A+B) x C (PF)
TOLERANCE: D
RATED VOLTAGE: BODY COLOR
PINK: 25V
GREEN: 50V
CHARACTERISTICS: E

COIL



INDUCTANCE: (10A+B) x C (μH)

COLOR	A,B	C	D	E
Black	0	10^0	±20%	For temperature compensation
Brown	1	10^1		
Red	2	10^2		
Orange	3	10^3		
Yellow	4	10^4		
Green	5	10^5		
Blue	6			
Violet	7			
Gray	8		±30%	High dielectric constant type
White	9			For temperature compensation
Gold		10^{-1}	±5%	
Silver		10^{-2}	±10%	High dielectric constant type

SERVICE MANUAL ABBREVIATION LIST

A	
A.DUB	Audio Dub
ACC	Automatic Color Control
ACK	Automatic Color Killer
ADD	Adder
AFC	Automatic Frequency Control
AGC	Automatic Gain Control
ALC	Automatic Level Control
ASBL	Assemble (Phase Matching)
APC	Automatic Phase Control
AUX	Auxiliary
B	
BATT.	Battery
BG	Burst Gate or Back Ground
BGP	Burst Gate Pulse
BH	Power Supply for Selecting VHF High Band
BL	Power Supply for Selecting VHF Low Band
BPF	Band-pass Filter
BS	Power Supply for Selecting VHF Super Band
BU	Power Supply for Selecting UHF Band
BUF.	Buffer Amplifier
C	
C	Chroma
C.FG/CFG	Capstan Frequency Generater
C.MEMORY	Counter Memory
C.PAUSE	Camera Pause
C.RESET	Counter Reset
C.REVERSE	Count Reverse
C.SYNC	Composite Synchronizing Signal
C/R	Capacitor/Resistor
CATV	Cable TV
CAPST.	Capstan
CCD	Charge Coupled Device
CH	Channel
CNR	Chroma Noise Reducer
CHAR.	Character
COM.	Common
COMP-EXP	Compressor-Expander
COMPA	Comparator
COMPE	Compensator
COM.	Composite
CONV.	Converter
CORR.	Correlation
COUNT.	Counter
CST	Cassette
CTL	Control Track Pulse
CYL.	Cylinder
D	
D/A	Digital to Analog
D/W	Dark/White
DA	Double Azimuth
DEEMPH.	Deemphasis
DEMOD.	Demodulator
DET	Detector
DISCRI.	Discriminator
DISP.	Display
DL	Delay line
DN	Down
DO	Dropout
DOC	Dropout Compensator
E	
E-E	Electronic-to-Electronic
EA-ROM	Electrically Alterable Read Only Memory
EMPH	Emphasis
EQ	Equalizer
EXT.	External
F	
FF	Flip Flop
F.FWD	Fast Forward
FG	Frequency Generator
FM	Frequency Modulation
FRAME ADV./F.ADV	Frame Advance
fsc	Color Sub Carrier Frequency
FWD	Forward
G	
GEN	Generator
GND	Ground
H	
HD	Horizontal Drive
Hi-Fi	High Fidelity
HPF	High-pass Filter
HPL	High-pass Limiter
HSS	Horizontal Sync. Separator
I	
I/O	In/Out (Input/Output)
IF	Intermediate Frequency
INDI.	Indicator
INT.	Internal
INV.	Inverter
IR	Infrared Rays
IRT	Instant Recording Timer
L	
LCD	Liquid Crystal Display
LIN.	Linear
LNC	Line Noise Canceller
LM	Loading Motor
LOG.	Logarithm
LPF	Low-pass Filter
L/R	Left/Right
LP	Long play
M	
M.CUT	Monitor Cut
M.STATE	Mechanism State
M.STOP	Memory Stop
MEM.	Memory
MIX	Mixer
MM	Monostable Multivibrator
MOD.	Modulator
MPX	Multiplex
MTS	Multi Channel Television Sound
N	
NF	Negative Feed Back
NORM.or NOR.	Normal
NR	Noise Reduction

O	
OSC	Oscillator
OSD	On-Screen Display
P	
PB/PLAY	Playback
PIF	Picture Intermediate Frequency
PLL	Phase Locked Loop
POS.	Positive
POWER CONT.	Power Control
PROG.	Program
PROTECT.	Protector
PWM	Pulse Width Modulation
R	
REC	Record
RECT.	Rectifier
REF	Reference
REG	Regulator
REV	Reverse
REW	Rewind
RF	Radio Frequency
RAM	Randum Access Memorey
ROM	Read Only Memory
S	
S/H	Sample and Hold
S.REEL	Supply Reel Sensor
S.TRACK.	Slow Tracking
S-VHS	Super VHS
SAW	Sawtooth
SAP	Second Audio Program
SEP.	Separator
SIF	Sound Intermediate Frequency
SP	Standard Play
SRCH	Search
SRV	Servo
SW 25Hz	Head Switching Pulse
SYNC	Synchronizing Signal
SYS.CON	System Control
T	
T/L	Tuner/Line
T.BRAKE	Take-up Brake
Tμp	Timer Microprocessor
T.REEL	Take-up Reel Sensor
T.RESET	Timer Reset
TP	Test Point
TRS	Transfer
TU-μP	Tuning Microprocessor
U	
U/D	Up/Down
UNI.	Unified
V	
V-REF	Voltage Reference
V.DRV	Vertical Drive Pulse
V.DUB	Video Dub
VAR.	Variable
VCA	Voltage Controlled Amplitier
VCO	Voltage Controlled Oscillator
VHS	Video Home Systems
Vss	Voltage Super Source
VOL.	Volume
VSS	Vertical Sync. Separator
VT	Tuning Voltage
VT-U	Tuning Voltage-UHF
VT-V	Tuning Voltage-VHF
W	
WE	Weighting
Y	
Y/C	Luminance/Chrominance

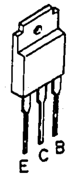
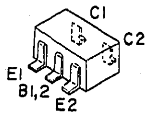
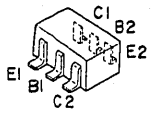
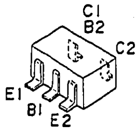
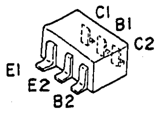
DIGITAL PROCESS CIRCUIT

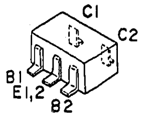
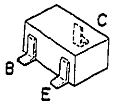
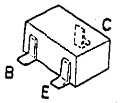
A	
ADC B-Y	Analog to Digital Converted B-Y Signal
ADC R-Y	Analog to Digital Converted R-Y Signal
ADC Y	Analog to Digital Converted Luminance
ADRS	Address
C	
CAS	Column Address Strobe
C.BLANK	Chroma Blanking
D	
DRAM	Dynamic Random Access Memory
DEMPX	Demultiplexer
DWC	Delayed Write Clock
DT/OE	Date Transfer /Output Enable
D.REF 25	Delayed Reference 25Hz
D.SW 25	Delayed Switching 25Hz
I	
INC	Row Counter Increment
M	
MEM	Memory
MEM VIDEO	Memorized Video
MEM SW	Memory Switch
MEM ON	Memory ON
MPX	Multiplexer
MPX VIDEO	Multiplexed Video
O	
O/E	Odd/Even Field
P	
P IN P	Picture in Picture
PIX MOVE	Picture Move
R	
RC	Reading Clock
RCC	Reading Clock Clear
RCR	Row Counter Reset
RAS	Row Address Strobe
REF 25	Reference 25Hz from servo circuit
REL	Refresh Control
S	
SC	Serial Control
W	
WC	Write Clock
WCC	Write Clock Clear
WRITE ENBL (WE)	Write Enable

SEMI-CONDUCTOR CONFIGURATION

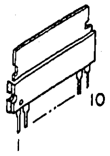
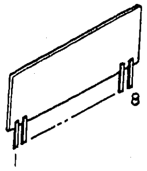
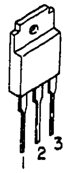
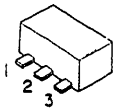
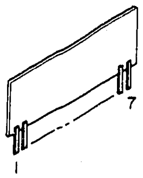
When replacing a semiconductor, take care of its pin numbers and makings (recess, paint) so as not to insert it in reverse.

TRANSISTOR

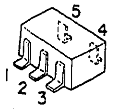
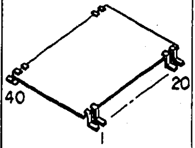
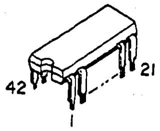
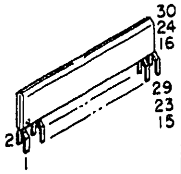
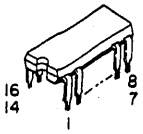
1	2	3	4	5
				
2SD1266	FMS2	IMH2	FMC2	IMT2 IMX2

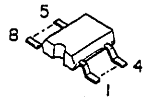
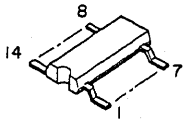
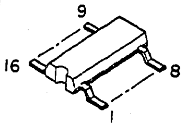
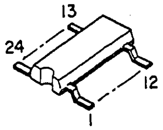
6	7	8
		
FMW1 FMW2	2SA812 2SB1001 2SA1036 2SB1182 2SA1037 2SC2412 2SA1121 2SC2618 2SB709 2SC2734	2SC2735 DTA144 2SC3016 DTC144 2SD1306 DTC124 2SD874 2SK323

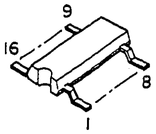
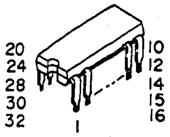
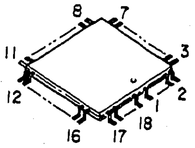
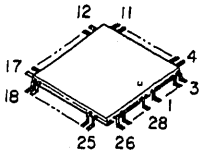
IC (SINGLE INLINE PACKAGE)

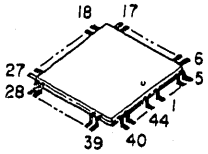
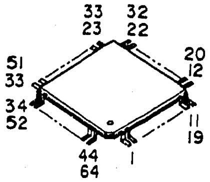
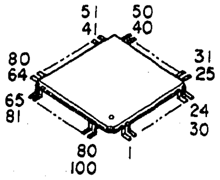
1	2	3	4	5
				
XRA6209U4	HTS7163C HTS7164A	M5278L05	8054ALB	HTS7165A

IC (DUAL INLINE PACKAGE)

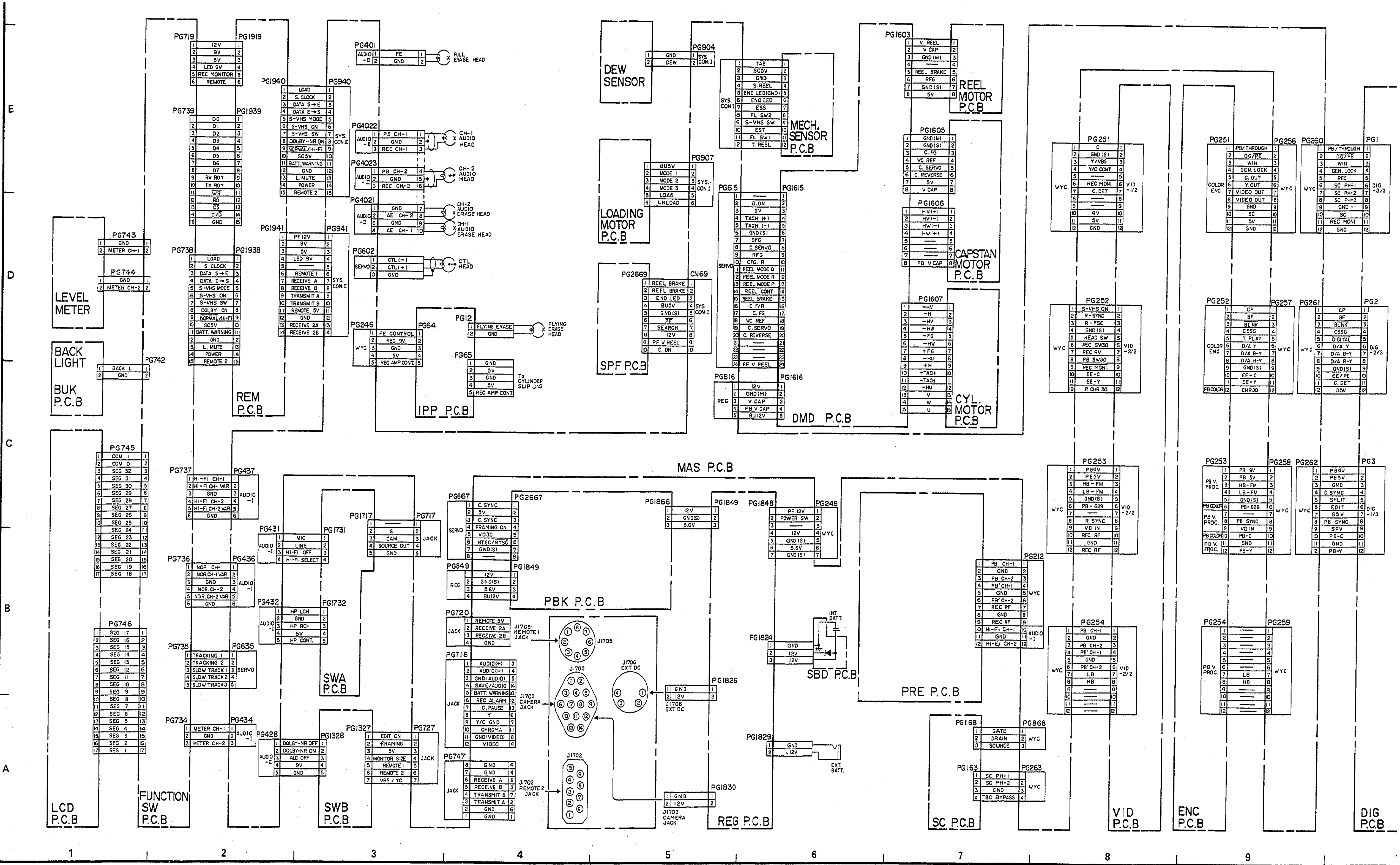
1	2	3	4	5
				
SC7500F SC7508F	HT4921C	HA12150NT HD49304NT	LA7927(30P) HM53461ZP(24P) M51486L(16P)	HTS7166(14P) CXA1101P(16P)

6	7	8	9
			
AN6558S BA2254F BA4558F LM2903M LP2951CM MB47082PF MPC358G MSM6856MS MSM6966MS NJM2234M NJM2238M NJM2240M	μPD4012BG μPD4013BG μPD4030BG μPD4066BG μPD4093BG HD74HC NJU74HC RC74HC SN74HC TC4S30F TC7S04F TC4066BF TC74HC	BA6303F HA118059FP HD74HC μPD74HC μPD4538BG	MSM6205GS

10	11	12	13
	 20 24 28 30 32 10 12 14 15 16 1	 8 7 11 3 12 2 1 18 16 17	 12 11 17 4 18 3 1 28 25 26
HA118059FP HA118104FP MB74LS μPD74HC	LB1684H(20P) LA7116(24P) HA12121NT(30P) M54874P(32P) HM63021P(28P)	HA11720MP HA118084MP VC2031MP	HA11532MP HA118066MP HA12115MP

14	15	16
 18 17 6 27 5 28 1 44 39 40	 33 23 32 22 20 12 51 33 34 52 11 19 44 64 1	 51 41 50 40 80 64 31 25 65 81 24 30 80 100 1
HA19211MP	μ71051GB(44P) MD4074019FP(64P)	HD49721A(80P) HG62E43R(80P) μPD75P308GF(80P) HG62E58R(100P)

INTERNAL WIRING DIAGRAM


E
D
C
B
A
1
2
3
4
5
6
7
8
9
LEVEL METER
BACK LIGHT
BUK P.C.B
LCD P.C.B
FUNCTION SW P.C.B
REM P.C.B
SWA P.C.B
SWB P.C.B
IPP P.C.B
PBK P.C.B
MAS P.C.B
DEW SENSOR
LOADING MOTOR P.C.B
SPF P.C.B
MECH. SENSOR P.C.B
DMD P.C.B
REEL MOTOR P.C.B
CAPSTAN MOTOR P.C.B
CYL. MOTOR P.C.B
SBD P.C.B
PRE P.C.B
REG P.C.B
SC P.C.B
VID P.C.B
ENC P.C.B
DIG P.C.B
PG719
PG1919
PG739
PG1939
PG738
PG1938
PG1940
PG940
PG1941
PG941
PG743
PG744
PG742
PG745
PG746
PG737
PG437
PG736
PG436
PG735
PG635
PG734
PG434
PG431
PG1731
PG432
PG1732
PG428
PG1328
PG1327
PG727
PG1717
PG717
PG401
PG4022
PG4023
PG4021
PG602
PG246
PG64
PG12
PG65
PG667
PG2667
PG849
PG1849
PG720
PG718
PG747
J1705
J1703
J1706 EXT DC
J1702
PG904
PG907
PG2669
CN69
PG615
PG1615
PG816
PG1616
PG1866
PG1849
PG1848
PG248
PG1824
PG1826
PG1829
PG1830
PG1603
PG1605
PG1606
PG1607
PG212
PG168
PG868
PG163
PG263
PG251
PG252
PG253
PG254
PG256
PG257
PG258
PG259
PG260
PG261
PG262
PG1
PG2
PG3
FULL ERASE HEAD
CH-1 AUDIO HEAD
CH-2 AUDIO HEAD
CH-2 AUDIO ERASE HEAD
CH-1 AUDIO ERASE HEAD
CTL HEAD
FLYING ERASE HEAD
To CYLINDER SLIP LING
J1705 REMOTE 1 JACK
J1703 CAMERA JACK
J1702 REMOTE 2 JACK
INT. BATT.
EXT. BATT.
VID -1/2
VID -2/2
DIG -3/3
DIG -2/3
DIG -1/3
WYC
SYS. CON. I
SYS. CON. II
SERVO
AUDIO -I
AUDIO -II
REG
JACK

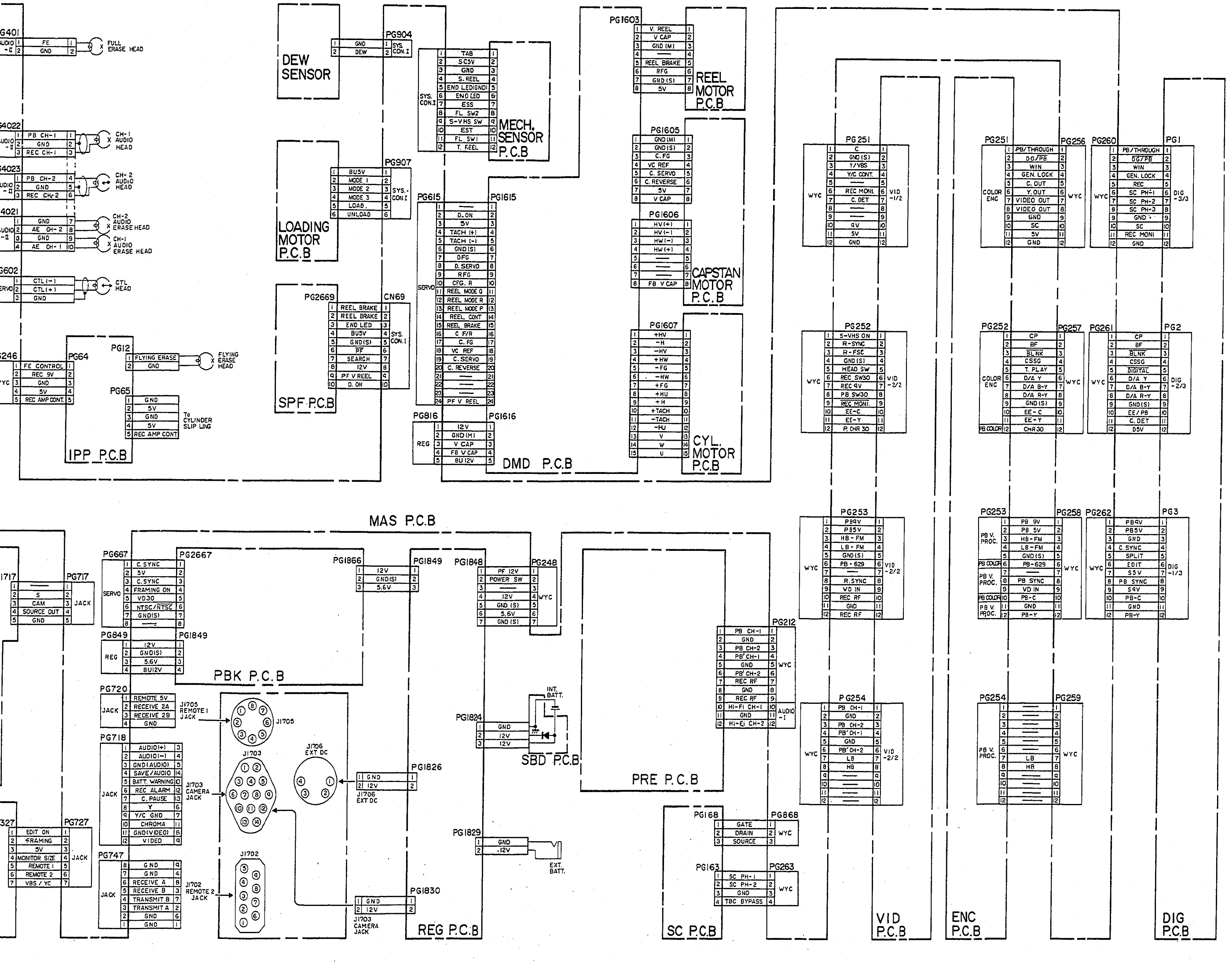
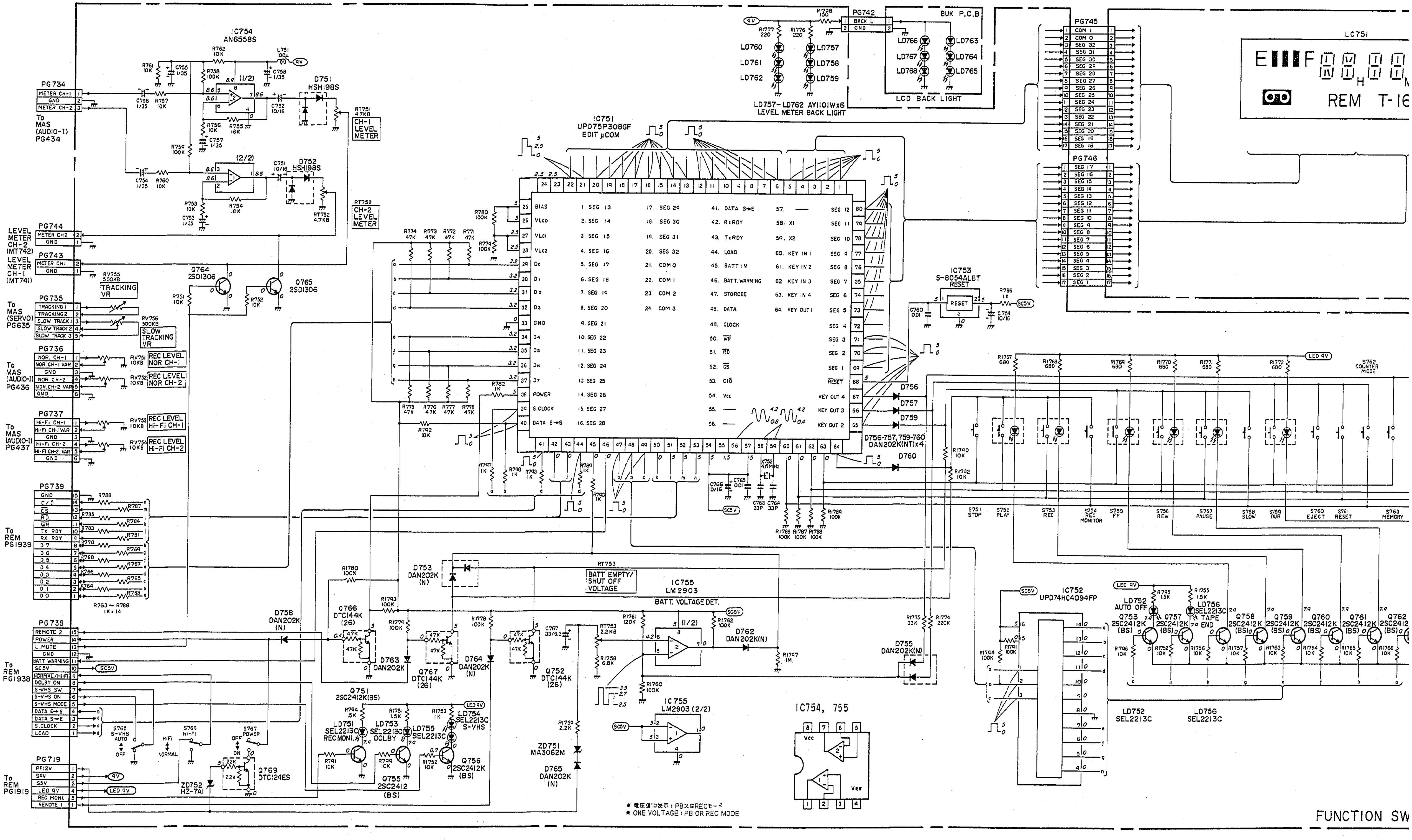
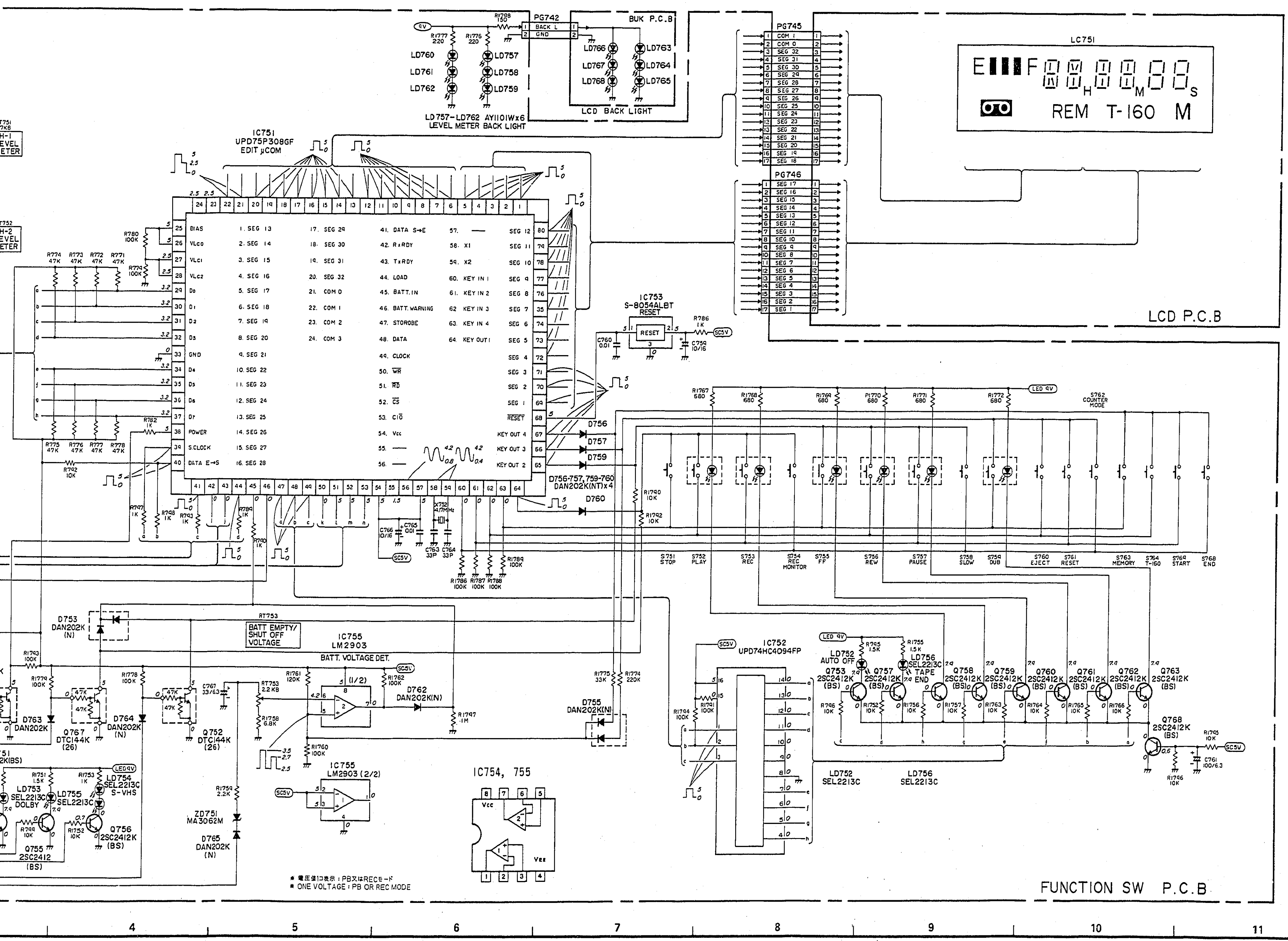

MAS P.C.B
DEW SENSOR
LOADING MOTOR P.C.B
SPF P.C.B
MECH. SENSOR P.C.B
DMD P.C.B
REEL MOTOR P.C.B
CAPSTAN MOTOR P.C.B
CYL. MOTOR P.C.B
IPP P.C.B
PBK P.C.B
REG P.C.B
SBD P.C.B
PRE P.C.B
SC P.C.B
VID P.C.B
ENC P.C.B
DIG P.C.B
FULL ERASE HEAD
CH-1 AUDIO HEAD
CH-2 AUDIO HEAD
CH-2 AUDIO ERASE HEAD
CH-1 AUDIO ERASE HEAD
CTL HEAD
FLYING ERASE HEAD
To CYLINDER SLIP LING
J1705 REMOTE 1 JACK
J1706 EXT DC
J1703 CAMERA JACK
J1702 REMOTE 2 JACK
INT. BATT.
EXT. BATT.
PG904
PG907
PG2669
CN69
PG615
PG1615
PG816
PG1616
PG1603
PG1605
PG1606
PG1607
PG12
PG64
PG65
PG251
PG252
PG253
PG254
PG256
PG257
PG258
PG259
PG260
PG261
PG262
PG1
PG2
PG3
PG667
PG2667
PG849
PG1849
PG1866
PG1848
PG248
PG720
PG718
PG747
PG717
PG727
PG1824
PG1826
PG1829
PG1830
PG212
PG168
PG868
PG163
PG263
3
4
5
6
7
8
9
10
11

DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO-I	5-33	5-68
AUDIO-II	5-36	5-68
COLOR ENCODER	5-49	5-74
DIG-1/3	5-52	5-76
DIG-2/3	5-55	5-76
DIG-3/3	5-58	5-76
DMD	5-18	5-62
FUNCTION SW	5-9	5-64
IPP	5-32	5-71
JACK	5-30	5-68
PB COLOR PROCESS	5-44	5-74
PB VIDEO	5-46	5-74
PBK	5-12	5-64
PREAMP	5-13	–
REG	5-20	5-66
REG(MAS)	5-31	5-68
REM	5-16	5-67
SC	5-26/31	5-71
SERVO	5-27	5-68
SPF	5-15	5-66
SYSTEM CONTROL-I	5-21	5-68
SYSTEM CONTROL-II	5-24	5-68
T/S	5-23	5-68
VID-1/2	5-39	5-72
VID-1/2	5-42	5-72
WYC	5-25	5-68

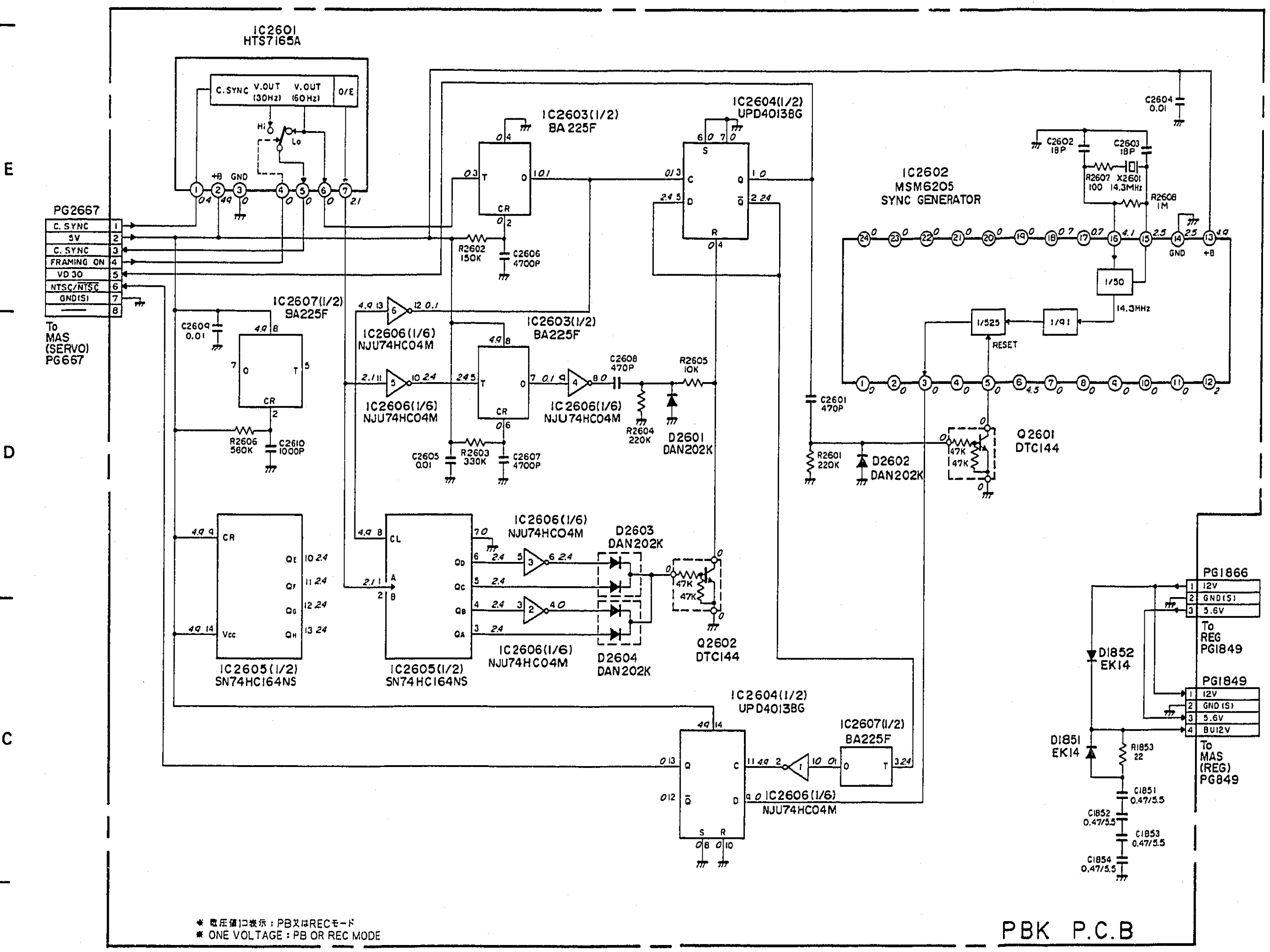
CTION SW SCHEMATIC DIAGRAM



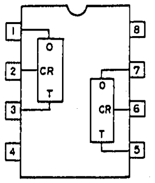
IC754
AN6558S
D751
HSH198S
D752
HSH198S
RT751
CH-1 LEVEL METER
RT752
CH-2 LEVEL METER
PG734
To MAS (AUDIO-I) PG434
PG744
LEVEL METER CH-2 (MT742)
PG743
LEVEL METER CH-1 (MT741)
Q764
2SD1306
Q765
2SD1306
PG735
To MAS (SERVO) PG635
TRACKING VR
SLOW TRACKING VR
PG736
To MAS (AUDIO-I) PG436
REC LEVEL NOR CH-1
REC LEVEL NOR CH-2
PG737
To MAS (AUDIO-I) PG437
REC LEVEL Hi-Fi CH-1
REC LEVEL Hi-Fi CH-2
PG739
To REM PG1939
R763 ~ R788
1K x 14
PG738
To REM PG1938
PG719
To REM PG1919
IC751
UPD75P308GF
EDIT μCOM
PG742
BUK P.C.B
LD757~LD762 AY1101Wx6
LEVEL METER BACK LIGHT
LCD BACK LIGHT
PG745
PG746
LC751
REM T-16
IC753
S-8054ALBT
RESET
D756
D757
D759
D760
D756-757, 759-760
DAN202K(NT)x4
S751 STOP
S752 PLAY
S753 REC
S754 REC MONITOR
S755 FF
S756 REW
S757 PAUSE
S758 SLOW
S759 DUB
S760 EJECT
S761 RESET
S762 COUNTER MODE
S763 MEMORY
D753
DAN202K (N)
RT753
BATT EMPTY/ SHUT OFF VOLTAGE
IC755
LM2903
BATT. VOLTAGE DET.
D758
DAN202K (N)
Q766
DTC144K (26)
D763
DAN202K
Q767
DTC144K (26)
D764
DAN202K (N)
Q752
DTC144K (26)
D762
DAN202K(N)
D755
DAN202K(N)
Q751
2SC2412K(BS)
LD751
SEL2213C
REC MONI.
LD753
SEL2213C
DOLBY
LD755
SEL2213C
LD754
SEL2213C
S-VHS
Q755
2SC2412 (BS)
Q756
2SC2412K (BS)
Q769
DTC124ES
ZD752
HZ-7A1
S765 S-VHS
S766 Hi-Fi
S767 POWER
ZD751
MA3062M
D765
DAN202K (N)
IC755
LM2903 (2/2)
IC754, 755
IC752
UPD74HC4094FP
LD752
AUTO OFF
LD756
TAPE END
LD752
SEL2213C
LD756
SEL2213C
Q753
2SC2412K (BS)
Q757
2SC2412K (BS)
Q758
2SC2412K (BS)
Q759
2SC2412K (BS)
Q760
2SC2412K (BS)
Q761
2SC2412K (BS)
Q762
2SC2412K (BS)
＊ 電圧値は表示：PB又はRECモード
＊ ONE VOLTAGE : PB OR REC MODE
FUNCTION SW
1
2
3
4
5
6
7
8
9
10


PG742
BACK L
GND
BUK P.C.B
LD766
LD767
LD768
LD763
LD764
LD765
LCD BACK LIGHT
R1777 220
R1776 220
R1798 150
LD760
LD761
LD762
LD757
LD758
LD759
LD757-LD762 AY1101Wx6
LEVEL METER BACK LIGHT
IC751
UPD75P308GF
EDIT μCOM
BIAS
VLc0
VLc1
VLc2
D0
D1
D2
D3
GND
D4
D5
D6
D7
POWER
S.CLOCK
DATA E→S
1. SEG 13
2. SEG 14
3. SEG 15
4. SEG 16
5. SEG 17
6. SEG 18
7. SEG 19
8. SEG 20
9. SEG 21
10. SEG 22
11. SEG 23
12. SEG 24
13. SEG 25
14. SEG 26
15. SEG 27
16. SEG 28
17. SEG 29
18. SEG 30
19. SEG 31
20. SEG 32
21. COM 0
22. COM 1
23. COM 2
24. COM 3
41. DATA S→E
42. RxRDY
43. TxRDY
44. LOAD
45. BATT.IN
46. BATT.WARNING
47. STOROBE
48. DATA
49. CLOCK
50. WR
51. RD
52. CS
53. CIO
54. Vcc
55. —
56. —
57. —
58. X1
59. X2
60. KEY IN 1
61. KEY IN 2
62. KEY IN 3
63. KEY IN 4
64. KEY OUT 1
SEG 12
SEG 11
SEG 10
SEG 9
SEG 8
SEG 7
SEG 6
SEG 5
SEG 4
SEG 3
SEG 2
SEG 1
RESET
KEY OUT 4
KEY OUT 3
KEY OUT 2
R780 100K
R779 100K
R774 47K
R773 47K
R772 47K
R771 47K
R775 47K
R776 47K
R777 47K
R778 47K
R782 1K
R792 10K
R747 1K
R748 1K
R793 1K
R789 1K
R790 1K
C766 10/16
C765 0.01
X752 4.17MHz
C763 33P
C764 33P
R1786 100K
R1787 100K
R1788 100K
R1789 100K
SC5V
PG745
COM 1
COM 0
SEG 32
SEG 31
SEG 30
SEG 29
SEG 28
SEG 27
SEG 26
SEG 25
SEG 24
SEG 23
SEG 22
SEG 21
SEG 20
SEG 19
SEG 18
PG746
SEG 17
SEG 16
SEG 15
SEG 14
SEG 13
SEG 12
SEG 11
SEG 10
SEG 9
SEG 8
SEG 7
SEG 6
SEG 5
SEG 4
SEG 3
SEG 2
SEG 1
LC751
E F
H M S
REM T-160 M
LCD P.C.B
IC753
S-8054ALBT
RESET
R786 1K
C760 0.01
C759 10/16
D756
D757
D759
D760
D756-757, 759-760
DAN202K(NT)x4
R1790 10K
R1792 10K
R1767 680
R1768 680
R1769 680
R1770 680
R1771 680
R1772 680
LED 9V
S762 COUNTER MODE
S751 STOP
S752 PLAY
S753 REC
S754 REC MONITOR
S755 FF
S756 REW
S757 PAUSE
S758 SLOW
S759 DUB
S760 EJECT
S761 RESET
S763 MEMORY
S764 T-160
S769 START
S768 END
D753 DAN202K (N)
RT753
BATT EMPTY/ SHUT OFF VOLTAGE
IC755 LM2903
BATT. VOLTAGE DET.
R1743 100K
R1779 100K
R1778 100K
D763 DAN202K
Q767 DTC144K (26)
D764 DAN202K (N)
Q752 DTC144K (26)
C767 33/6.3
RT753 2.2KB
R1758 6.8K
R1761 120K
R1762 100K
R1760 100K
D762 DAN202K(N)
R1797 1M
R1775 33K
R1774 220K
D755 DAN202K(N)
R1759 2.2K
ZD751 MA3062M
D765 DAN202K (N)
IC755 LM2903 (2/2)
IC754, 755
Vcc
Vee
R1751 1.5K
R1753 1K
LD753 SEL2213C DOLBY
LD755 SEL2213C
LD754 SEL2213C S-VHS
R1799 10K
R1752 10K
Q755 2SC2412 (BS)
Q756 2SC2412K (BS)
IC752
UPD74HC4094FP
R1794 100K
R1791 100K
R1795 1.5K
R1755 1.5K
LD752 AUTO OFF
LD756 SEL2213C TAPE END
Q753 2SC2412K (BS)
Q757 2SC2412K (BS)
Q758 2SC2412K (BS)
Q759 2SC2412K (BS)
Q760 2SC2412K (BS)
Q761 2SC2412K (BS)
Q762 2SC2412K (BS)
Q763 2SC2412K (BS)
Q768 2SC2412K (BS)
R1745 10K
C761 100/6.3
R1796 10K
LD752 SEL2213C
LD756 SEL2213C
※ 電圧値1つ表示：PB又はRECモード
※ ONE VOLTAGE : PB OR REC MODE
FUNCTION SW P.C.B
4
5
6
7
8
9
10
11

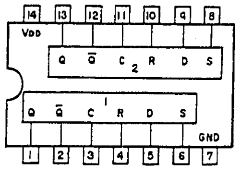
PBK SCHEMATIC DIAGRAM


IC2601
HTS7165A
C.SYNC
V.OUT (30Hz)
V.OUT (60Hz)
O/E
Hi
Lo
PG2667
C.SYNC
5V
C.SYNC
FRAMING ON
VD 30
NTSC/NTSC
GND(S)
To MAS (SERVO) PG667
IC2603(1/2)
BA225F
IC2604(1/2)
UPD4013BG
IC2602
MSM6205
SYNC GENERATOR
C2604 0.01
C2602 18P
C2603 18P
R2607 100
X2601 14.3MHz
R2608 1M
1/50
14.3MHz
1/525
1/91
RESET
R2602 150K
C2606 4700P
IC2607(1/2)
BA225F
C2609 0.01
IC2606(1/6)
NJU74HC04M
IC2603(1/2)
BA225F
C2608 470P
R2605 10K
R2604 220K
D2601
DAN202K
C2601 470P
R2601 220K
D2602
DAN202K
Q2601
DTC144
R2606 560K
C2610 1000P
C2605 0.01
R2603 330K
C2607 4700P
IC2606(1/6)
NJU74HC04M
D2603
DAN202K
Q2602
DTC144
D2604
DAN202K
IC2605(1/2)
SN74HC164NS
IC2605(1/2)
SN74HC164NS
IC2604(1/2)
UPD4013BG
IC2607(1/2)
BA225F
IC2606(1/6)
NJU74HC04M
PG1866
12V
GND(S)
5.6V
To REG PG1849
PG1849
12V
GND(S)
5.6V
BU12V
To MAS (REG) PG849
D1852
EK14
D1851
EK14
R1853 22
C1851 0.47/5.5
C1852 0.47/5.5
C1853 0.47/5.5
C1854 0.47/5.5
※ 電圧値表示：PB又はRECモード
※ ONE VOLTAGE : PB OR REC MODE
PBK P.C.B

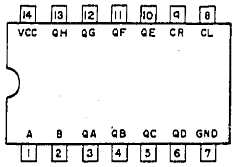
IC2603, 2607



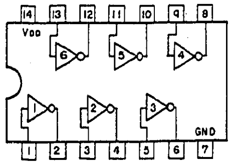
IC2604


VDD
Q Q̄ C 2 R D S
Q Q̄ C 1 R D S
GND

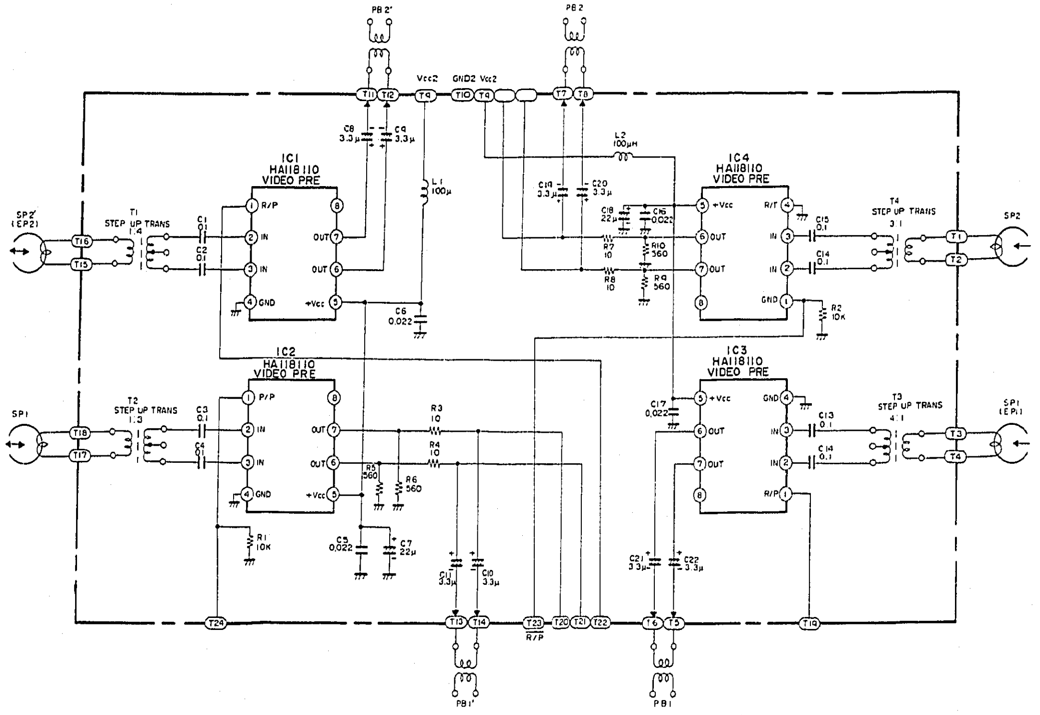
IC2605

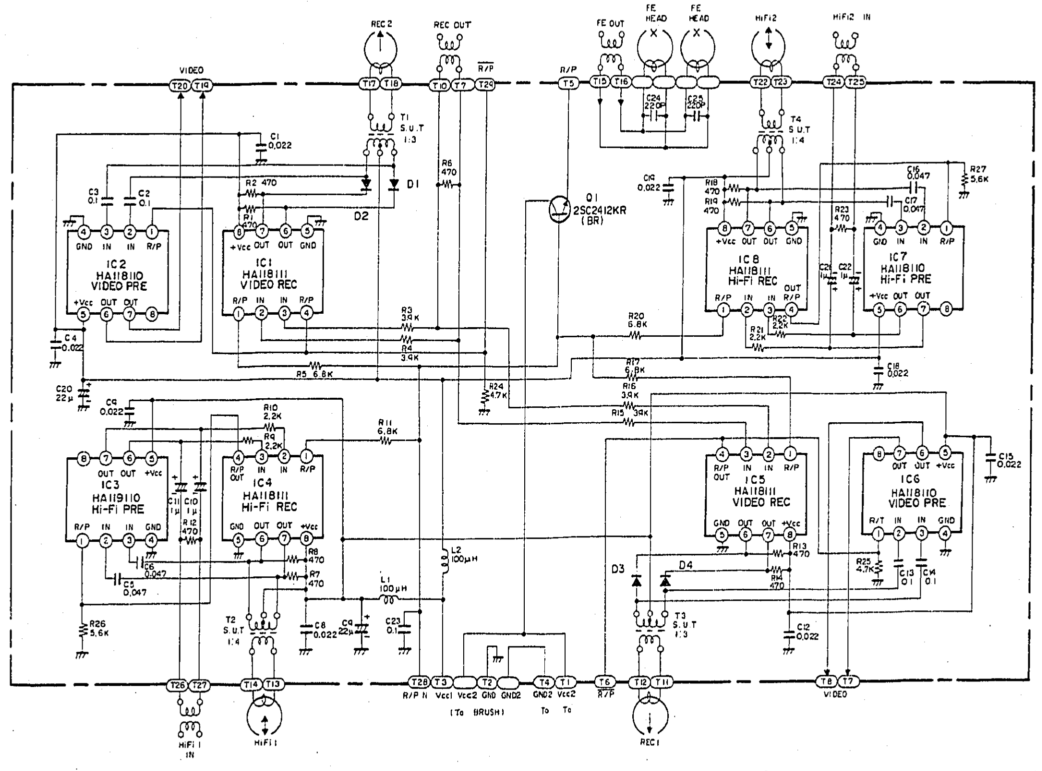

VCC QH QG QF QE CR CL
A B QA QB QC QD GND

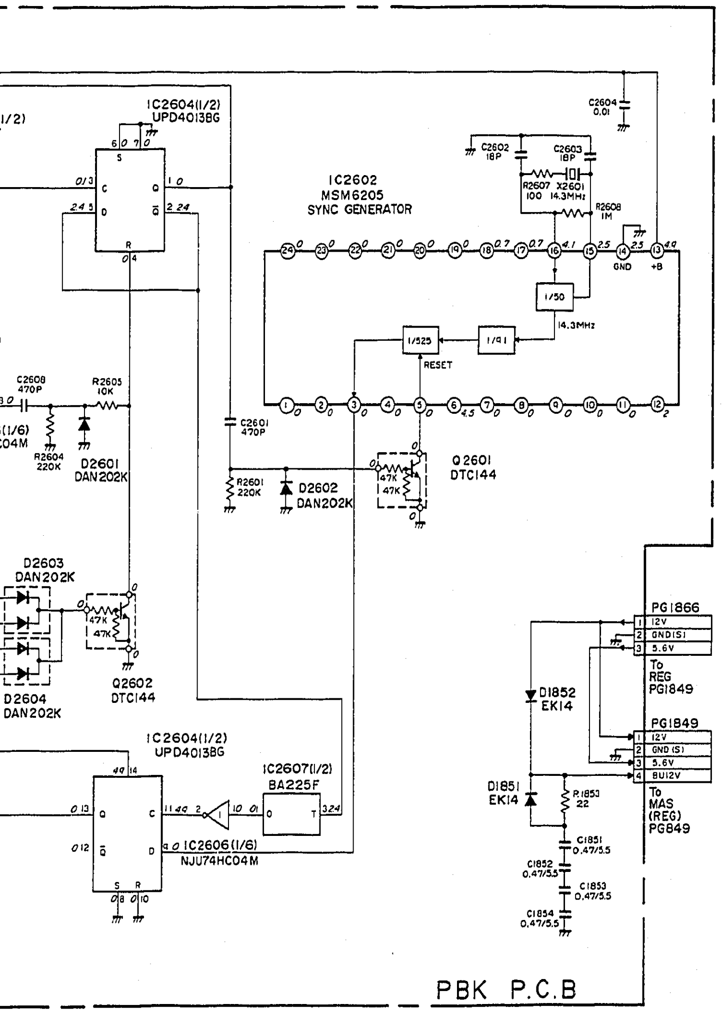
IC2606



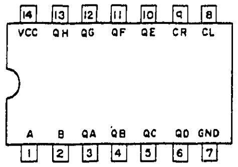
PREAMP SCHEMATIC DIAGRAM


PB2'
PB2
Vcc2
GND2 Vcc2
IC1
HA118110
VIDEO PRE
IC4
HA118110
VIDEO PRE
IC2
HA118110
VIDEO PRE
IC3
HA118110
VIDEO PRE
SP2' (EP2)
SP2
SP1
SP1 (EP1)
T1 STEP UP TRANS 1:4
T4 STEP UP TRANS 3:1
T2 STEP UP TRANS 1:3
T3 STEP UP TRANS 4:1
L1 100μ
L2 100μH
PB1'
PB1
R/P

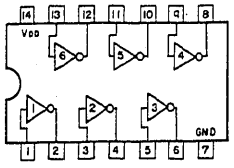

REC 2
REC OUT
R/P
FE OUT
FE HEAD
FE HEAD
HiFi2
HiFi2 IN
VIDEO
IC2
HA118110
VIDEO PRE
IC1
HA118111
VIDEO REC
Q1
2SC2412KR (BR)
IC8
HA118111
Hi-Fi REC
IC7
HA118110
Hi-Fi PRE
IC3
HA119110
Hi-Fi PRE
IC4
HA118111
Hi-Fi REC
IC5
HA118111
VIDEO REC
IC6
HA118110
VIDEO PRE
T1 S.U.T 1:3
T2 S.U.T 1:4
T3 S.U.T 1:3
T4 S.U.T 1:4
L1 100μH
L2 100μH
D1
D2
D3
D4
HiFi1 IN
HiFi1
R/P N
Vcc1
Vcc2
GND
GND2
(To BRUSH)
To
R/P
REC1
VIDEO


IC2604(1/2)
UPD4013BG
IC2602
MSM6205
SYNC GENERATOR
C2602 18P
C2603 18P
R2607 100
X2601 14.3MHz
R2608 1M
C2604 0.01
1/50
14.3MHz
1/525
1/91
RESET
C2601 470P
R2601 220K
D2602 DAN202K
Q2601 DTC144
C2608 470P
R2605 10K
R2604 220K
D2601 DAN202K
D2603 DAN202K
D2604 DAN202K
Q2602 DTC144
PG1866
12V
GND(S)
5.6V
To REG PG1849
PG1849
12V
GND(S)
5.6V
BU12V
To MAS (REG) PG849
D1852 EK14
D1851 EK14
R1853 22
C1851 0.47/5.5
C1852 0.47/5.5
C1853 0.47/5.5
C1854 0.47/5.5
IC2604(1/2)
UPD4013BG
IC2607(1/2)
BA225F
IC2606(1/6)
NJU74HC04M
PBK P.C.B

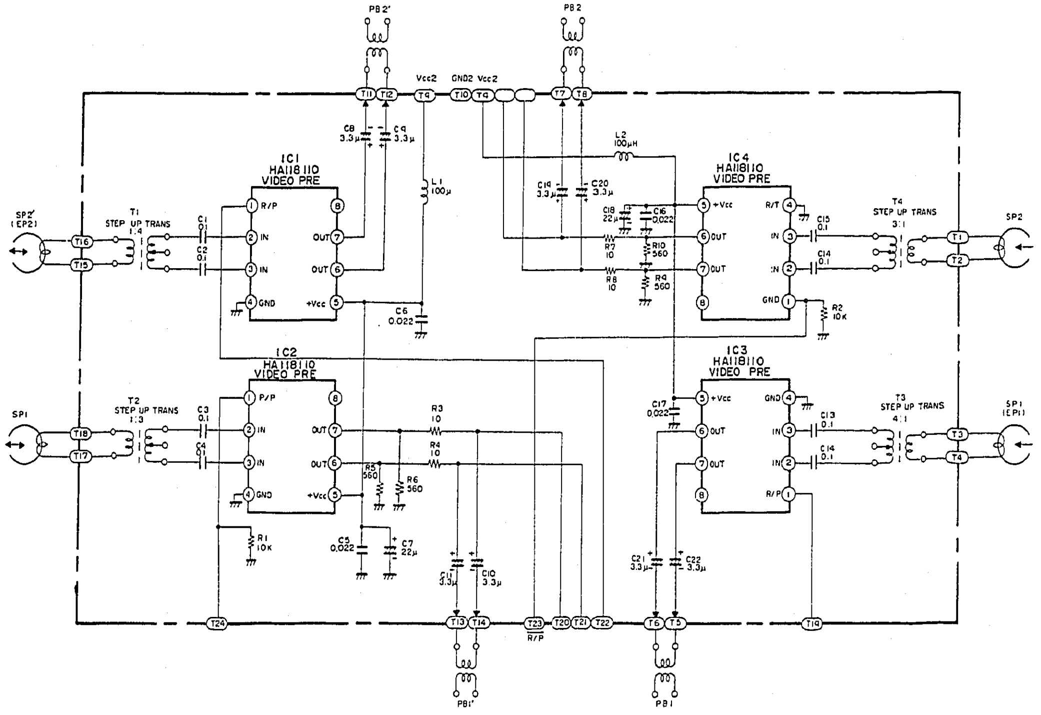
IC2605


VCC QH QG QF QE CR CL
A B QA QB QC QD GND

IC2606



PREAMP SCHEMATIC DIAGRAM


PB2'
PB2
IC1 HA118110 VIDEO PRE
IC2 HA118110 VIDEO PRE
IC3 HA118110 VIDEO PRE
IC4 HA118110 VIDEO PRE
T1 STEP UP TRANS 1:4
T2 STEP UP TRANS 1:3
T3 STEP UP TRANS 4:1
T4 STEP UP TRANS 3:1
SP2' (EP2)
SP1
SP2
SP1 (EP1)
L1 100μ
L2 100μH
R1 10K
R2 10K
PB1'
PB1
R/P

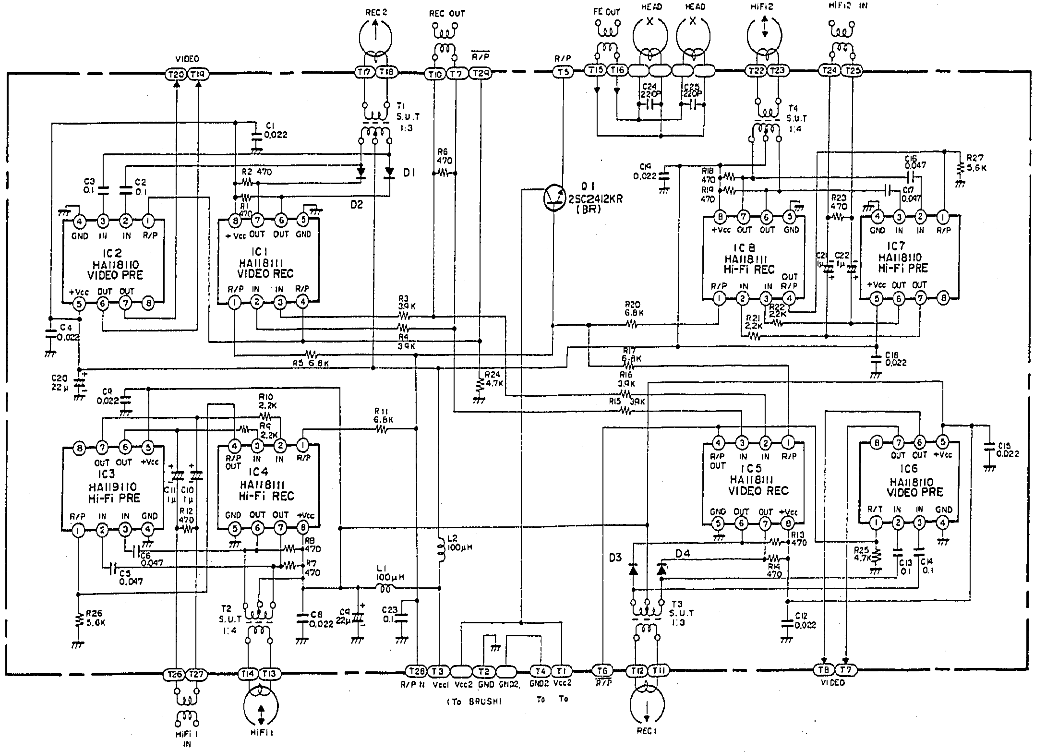
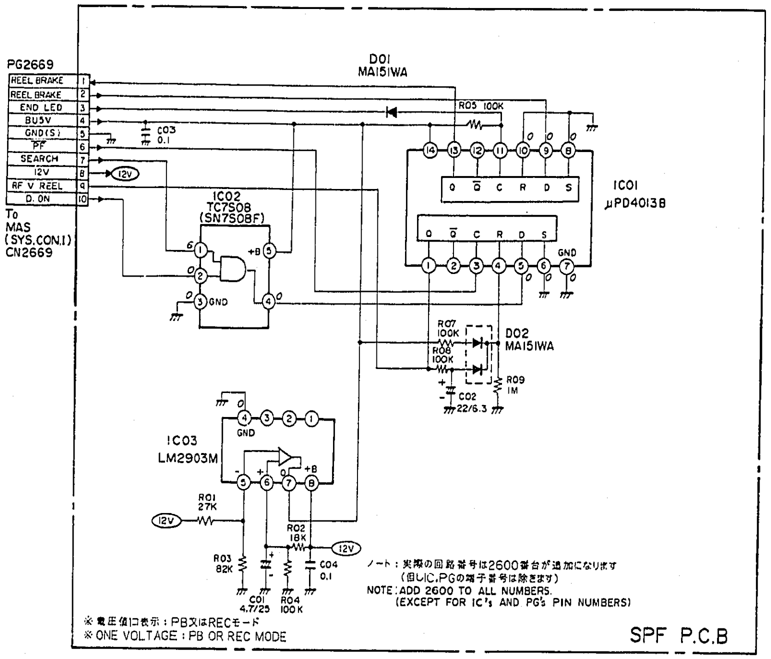

VIDEO
REC2
REC OUT
FE OUT
FE HEAD
HiFi2
HiFi2 IN
IC1 HA118111 VIDEO REC
IC2 HA118110 VIDEO PRE
IC3 HA119110 Hi-Fi PRE
IC4 HA118111 Hi-Fi REC
IC5 HA118111 VIDEO REC
IC6 HA118110 VIDEO PRE
IC7 HA118110 Hi-Fi PRE
IC8 HA118111 Hi-Fi REC
Q1 2SC2412KR (BR)
T1 S.U.T 1:3
T2 S.U.T 1:4
T3 S.U.T 1:3
T4 S.U.T 1:4
L1 100μH
L2 100μH
D1
D2
D3
D4
R/P IN
Vcc1 Vcc2 GND GND2 GND2 Vcc2
(To BRUSH)
To To
HiFi1 IN
HiFi1
REC1
VIDEO

DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO-Ⅰ	5-33	5-68
AUDIO-Ⅱ	5-36	5-68
COLOR ENCODER	5-49	5-74
DIG-1/3	5-52	5-76
DIG-2/3	5-55	5-76
DIG-3/3	5-58	5-76
DMD	5-18	5-62
FUNCTION SW	5-9	5-64
IPP	5-32	5-71
JACK	5-30	5-68
PB COLOR PROCESS	5-44	5-74
PB VIDEO	5-46	5-74
PBK	5-12	5-64
PREAMP	5-13	-
REG	5-20	5-66
REG(MAS)	5-31	5-68
REM	5-16	5-67
SC	5-26/31	5-71
SERVO	5-27	5-68
SPF	5-15	5-66
SYSTEM CONTROL-Ⅰ	5-21	5-68
SYSTEM CONTROL-Ⅱ	5-24	5-68
T/S	5-23	5-68
VID-1/2	5-39	5-72
VID-1/2	5-42	5-72
WYC	5-25	5-68

F SCHEMATIC DIAGRAM

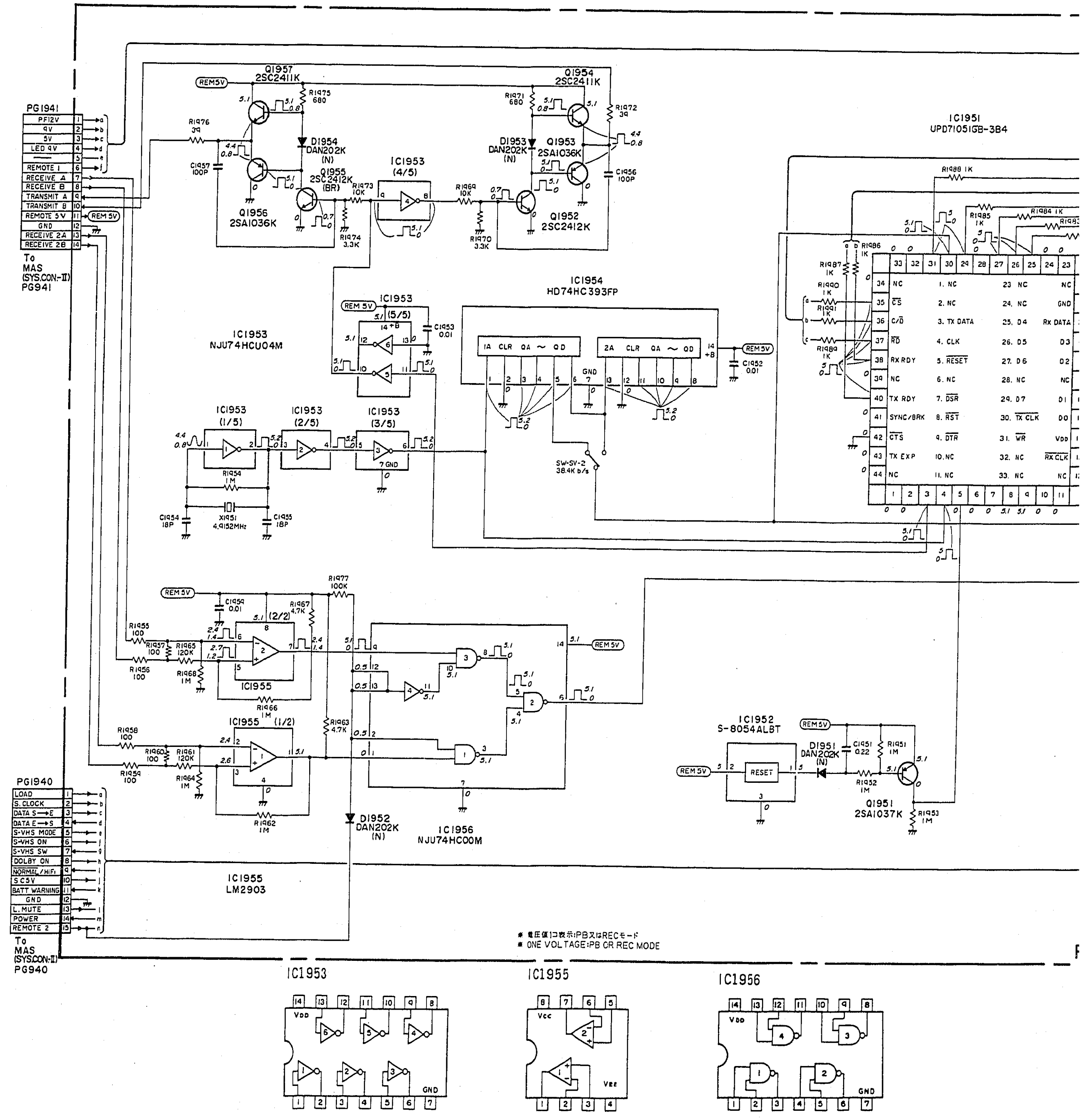

PG2669
REEL BRAKE
REEL BRAKE
END LED
BU5V
GND(S)
PF
SEARCH
12V
RF V REEL
D. ON
To MAS (SYS.CON.I) CN2669
D01 MA151WA
R05 100K
C03 0.1
IC02 TC7S08 (SN7S08F)
IC01 μPD4013B
Q Q̄ C R D S
GND
IC03 LM2903M
R01 27K
R02 18K
R03 82K
R04 100K
C01 4.7/25
C04 0.1
R07 100K
R08 100K
D02 MA151WA
R09 1M
C02 22/6.3
12V
SPF P.C.B

ノート：実際の回路番号は2600番台が追加になります
（但しIC,PGの端子番号は除きます）
NOTE: ADD 2600 TO ALL NUMBERS.
(EXCEPT FOR IC's AND PG's PIN NUMBERS)

※電圧値1コ表示：PB又はRECモード
※ONE VOLTAGE : PB OR REC MODE

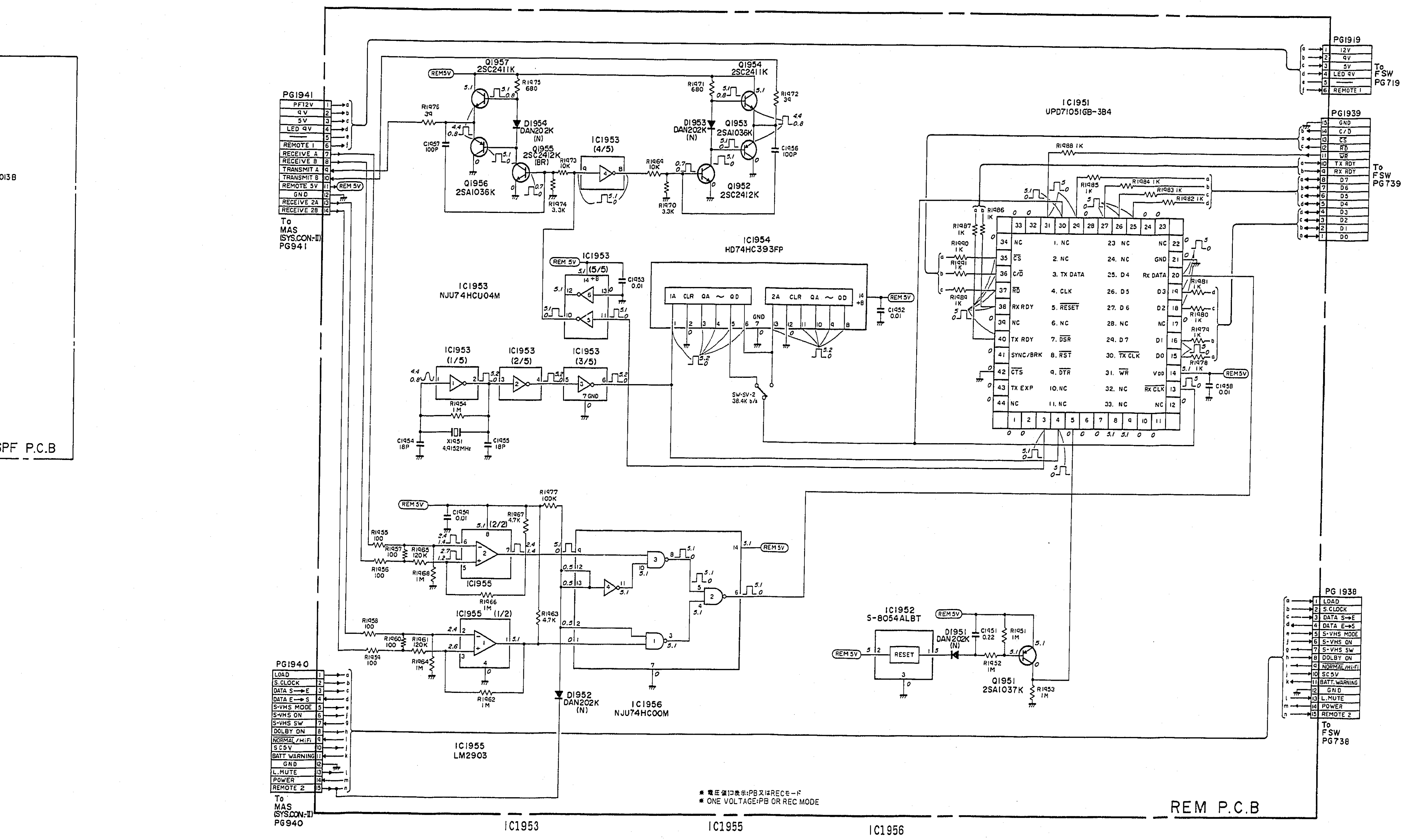
DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO-I	5-33	5-68
AUDIO-II	5-36	5-68
COLOR ENCODER	5-49	5-74
DIG-1/3	5-52	5-76
DIG-2/3	5-55	5-76
DIG-3/3	5-58	5-76
DMD	5-18	5-62
FUNCTION SW	5-9	5-64
IPP	5-32	5-71
JACK	5-30	5-68
PB COLOR PROCESS	5-44	5-74
PB VIDEO	5-46	5-74
PBK	5-12	5-64
PREAMP	5-13	-
REG	5-20	5-66
REG(MAS)	5-31	5-68
REM	5-16	5-67
SC	5-26/31	5-71
SERVO	5-27	5-68
SPF	5-15	5-66
SYSTEM CONTROL-I	5-21	5-68
SYSTEM CONTROL-II	5-24	5-68
T/S	5-23	5-68
VID-1/2	5-39	5-72
VID-1/2	5-42	5-72
WYC	5-25	5-68

REM SCHEMATIC DIAGRAM


PG1941
PF12V
9V
5V
LED 9V
REMOTE I
RECEIVE A
RECEIVE B
TRANSMIT A
TRANSMIT B
REMOTE 5V
GND
RECEIVE 2A
RECEIVE 2B
To MAS (SYS.CON-II) PG941
REM5V
Q1957 2SC2411K
R1975 680
R1976 39
C1957 100P
D1954 DAN202K (N)
Q1956 2SA1036K
Q1955 2SC2412K (BR)
R1973 10K
R1974 3.3K
IC1953 (4/5)
R1969 10K
R1970 3.3K
Q1952 2SC2412K
Q1954 2SC2411K
R1971 680
R1972 39
D1953 DAN202K (N)
Q1953 2SA1036K
C1956 100P
IC1951 UPD71051GB-3B4
R1988 1K
R1985 1K
R1984 1K
R1986 1K
R1987 1K
R1990 1K
R1991 1K
R1989 1K
NC
CS
C/D
RD
RX RDY
TX RDY
SYNC/BRK
CTS
TX EXP
1. NC
2. NC
3. TX DATA
4. CLK
5. RESET
6. NC
7. DSR
8. RST
9. DTR
10. NC
11. NC
23 NC
24. NC
25. D4
26. D5
27. D6
28. NC
29. D7
30. TX CLK
31. WR
32. NC
33. NC
GND
RX DATA
D3
D2
D1
D0
VDD
RX CLK
IC1953 (5/5)
C1953 0.01
IC1954 HD74HC393FP
1A CLR QA ~ QD
2A CLR QA ~ QD
C1952 0.01
IC1953 NJU74HCU04M
IC1953 (1/5)
IC1953 (2/5)
IC1953 (3/5)
R1954 1M
C1954 18P
X1951 4.9152MHz
C1955 18P
SW-SY-2 38.4K b/s
R1977 100K
C1959 0.01
R1967 4.7K
IC1955 (2/2)
R1955 100
R1957 100
R1965 120K
R1956 100
R1968 1M
R1966 1M
IC1955 (1/2)
R1963 4.7K
R1958 100
R1960 100
R1961 120K
R1959 100
R1964 1M
R1962 1M
D1952 DAN202K (N)
IC1956 NJU74HC00M
IC1955 LM2903
IC1952 S-8054ALBT
RESET
D1951 DAN202K (N)
C1951 0.22
R1951 1M
R1952 1M
Q1951 2SA1037K
R1953 1M
PG1940
LOAD
S.CLOCK
DATA S→E
DATA E→S
S-VHS MODE
S-VHS ON
S-VHS SW
DOLBY ON
NORMAL/HiFi
SC5V
BATT WARNING
GND
L.MUTE
POWER
REMOTE 2
To MAS (SYS.CON-II) PG940
IC1953
IC1955
IC1956
VDD
Vcc
VEE
GND

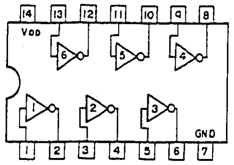
※電圧値1コ表示：PB又はRECモード
※ONE VOLTAGE:PB OR REC MODE

REM SCHEMATIC DIAGRAM

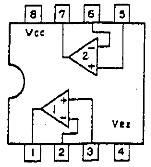

013B
SPF P.C.B
PG1941
PF12V
9V
5V
LED 9V
REMOTE 1
RECEIVE A
RECEIVE B
TRANSMIT A
TRANSMIT B
REMOTE 5V
GND
RECEIVE 2A
RECEIVE 2B
REM 5V
To
MAS
(SYS.CON-II)
PG941
Q1957
2SC2411K
R1975
680
R1976
39
C1957
100P
D1954
DAN202K
(N)
Q1955
2SC2412K
(BR)
Q1956
2SA1036K
R1973
10K
R1974
3.3K
IC1953
(4/5)
R1969
10K
R1970
3.3K
Q1954
2SC2411K
R1971
680
R1972
39
D1953
DAN202K
(N)
Q1953
2SA1036K
C1956
100P
Q1952
2SC2412K
IC1951
UPD71051GB-3B4
R1988 1K
R1985
1K
R1984 1K
R1983 1K
R1982 1K
R1986
1K
R1987
1K
R1990
1K
R1991
1K
R1989
1K
R1981
1K
R1980
1K
R1979
1K
R1978
1K
C1958
0.01
1. NC
2. NC
3. TX DATA
4. CLK
5. RESET
6. NC
7. DSR
8. RST
9. DTR
10. NC
11. NC
23 NC
24. NC
25. D4
26. D5
27. D6
28. NC
29. D7
30. TX CLK
31. WR
32. NC
33. NC
NC
CS
C/D
RD
RX RDY
NC
TX RDY
SYNC/BRK
CTS
TX EXP
NC
NC
GND
RX DATA
D3
D2
NC
D1
D0
VDD
RX CLK
NC
PG1919
12V
9V
5V
LED 9V
REMOTE 1
To
FSW
PG719
PG1939
GND
C/D
CS
RD
WR
TX RDY
RX RDY
D7
D6
D5
D4
D3
D2
D1
D0
To
FSW
PG739
IC1953
(5/5)
C1953
0.01
IC1953
NJU74HCU04M
IC1954
HD74HC393FP
1A CLR QA ~ QD
2A CLR QA ~ QD
C1952
0.01
GND
SW-SV-2
38.4K b/s
IC1953
(1/5)
IC1953
(2/5)
IC1953
(3/5)
R1954
1M
C1954
18P
X1951
4.9152MHz
C1955
18P
7 GND
R1977
100K
C1959
0.01
R1967
4.7K
(2/2)
R1955
100
R1957
100
R1965
120K
R1956
100
R1968
1M
IC1955
R1966
1M
R1963
4.7K
IC1955 (1/2)
R1958
100
R1960
100
R1961
120K
R1959
100
R1964
1M
R1962
1M
D1952
DAN202K
(N)
IC1956
NJU74HC00M
IC1955
LM2903
IC1952
S-8054ALBT
RESET
D1951
DAN202K
(N)
C1951
0.22
R1951
1M
R1952
1M
Q1951
2SA1037K
R1953
1M
PG 1938
LOAD
S.CLOCK
DATA S→E
DATA E→S
S-VHS MODE
S-VHS ON
S-VHS SW
DOLBY ON
NORMAL/Hi-Fi
SC5V
BATT. WARNING
GND
L.MUTE
POWER
REMOTE 2
To
FSW
PG738
PG1940
LOAD
S.CLOCK
DATA S→E
DATA E→S
S-VHS MODE
S-VHS ON
S-VHS SW
DOLBY ON
NORMAL/HiFi
SC5V
BATT WARNING
GND
L.MUTE
POWER
REMOTE 2
To
MAS
(SYS.CON-II)
PG940
REM P.C.B

＊ 電圧値1コ表示:PB又はRECモード
＊ ONE VOLTAGE:PB OR REC MODE

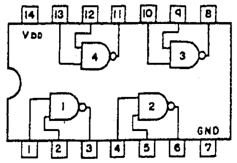
IC1953


14
13
12
11
10
9
8
VDD
6
5
4
1
2
3
GND
1
2
3
4
5
6
7

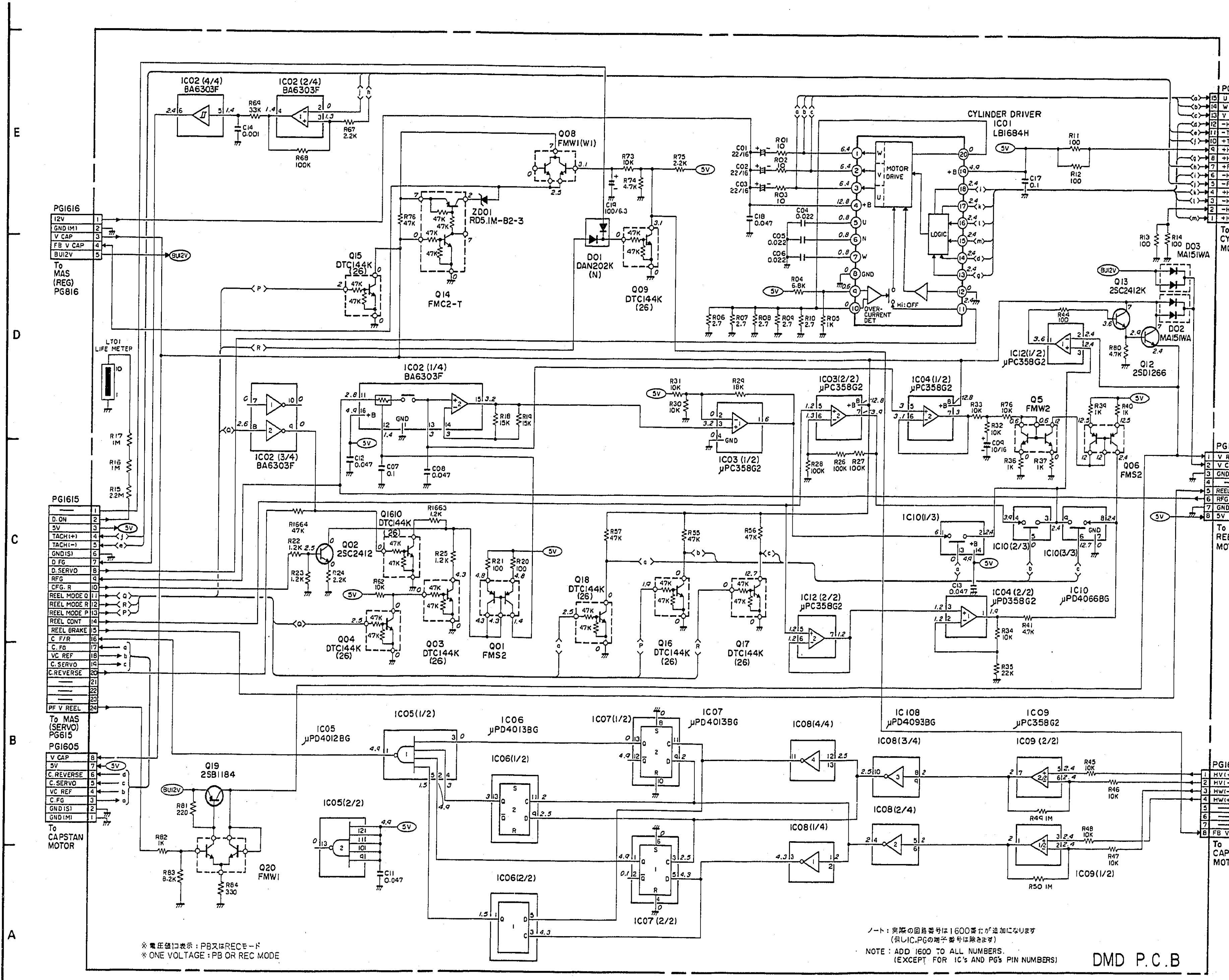
IC1955


8
7
6
5
Vcc
2
1
VEE
1
2
3
4

IC1956


14
13
12
11
10
9
8
VDD
4
3
1
2
GND
1
2
3
4
5
6
7

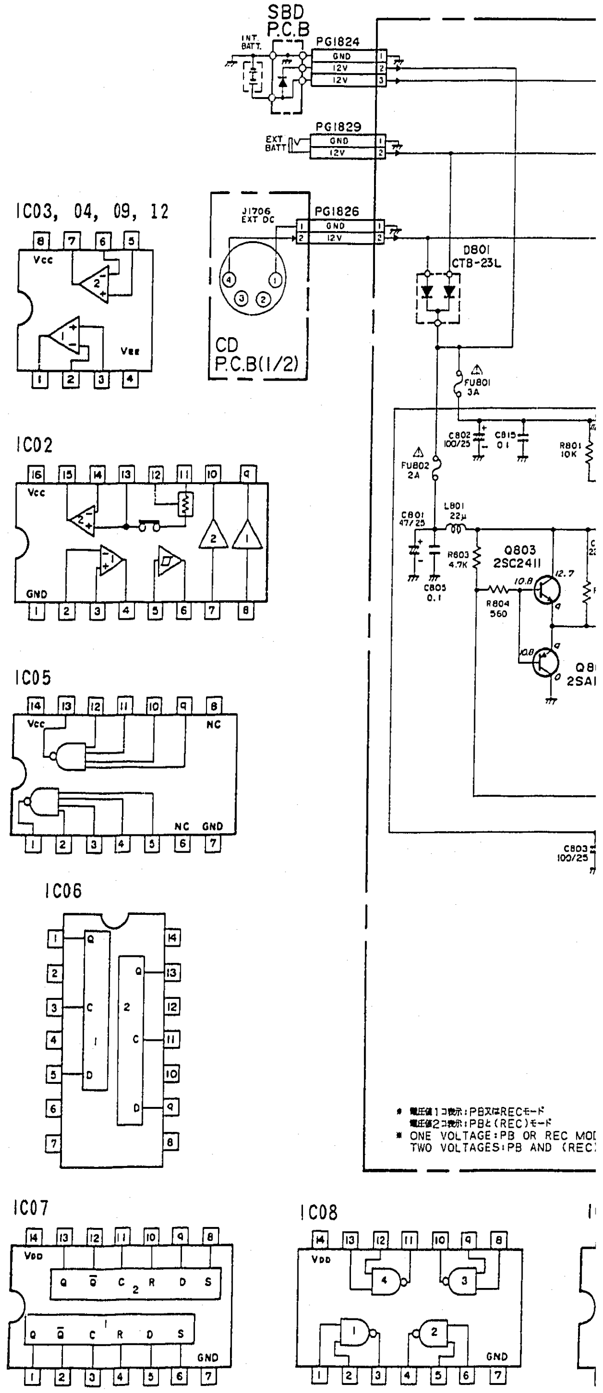
DMD SCHEMATIC DIAGRAM


CYLINDER DRIVER
IC01 LB1684H
MOTOR DRIVE
LOGIC
OVER-CURRENT DET
HI:OFF
IC02 (4/4) BA6303F
IC02 (2/4) BA6303F
IC02 (1/4) BA6303F
IC02 (3/4) BA6303F
Q08 FMW1(W1)
Z001 RD5.1M-B2-3
Q14 FMC2-T
Q15 DTC144K (26)
D01 DAN202K (N)
Q09 DTC144K (26)
PG1616
12V
GND(M)
V CAP
FB V CAP
BU12V
To MAS (REG) PG816
LT01 LIFE METER
PG1607
To CYL. MOTOR
D03 MA151WA
Q13 2SC2412K
D02 MA151WA
Q12 2SD1266
IC12(1/2) μPC358G2
IC03 (1/2) μPC358G2
IC03(2/2) μPC358G2
IC04 (1/2) μPC358G2
Q5 FMW2
Q06 FMS2
PG1603
V REEL
V CAP
GND(M)
REEL BRAKE
RFG
GND(S)
5V
To REEL MOTOR
PG1615
D.ON
5V
TACH(+)
TACH(−)
GND(S)
D.FG
D.SERVO
RFG
CFG.R
REEL MODE Q
REEL MODE R
REEL MODE P
REEL CONT
REEL BRAKE
C.F/R
C.FG
VC REF
C.SERVO
C.REVERSE
PF V REEL
To MAS (SERVO) PG615
Q02 2SC2412
Q1610 DTC144K
Q04 DTC144K (26)
Q03 DTC144K (26)
Q01 FMS2
Q18 DTC144K (26)
Q16 DTC144K (26)
Q17 DTC144K (26)
IC12 (2/2) μPC358G2
IC10(1/3)
IC10(2/3)
IC10(3/3)
IC04 (2/2) μPD358G2
IC10 μPD4066BG
PG1605
V CAP
5V
C.REVERSE
C.SERVO
VC REF
C.FG
GND(S)
GND(M)
To CAPSTAN MOTOR
Q19 2SB1184
Q20 FMW1
IC05 μPD4012BG
IC05(1/2)
IC05(2/2)
IC06 μPD4013BG
IC06(1/2)
IC06(2/2)
IC07(1/2)
IC07 μPD4013BG
IC07 (2/2)
IC108 μPD4093BG
IC08(4/4)
IC08(3/4)
IC08(2/4)
IC08(1/4)
IC09 μPC358G2
IC09 (2/2)
IC09(1/2)
PG1606
HV(+)
HV(−)
HW(−)
HW(+)
FB V CAP
To CAPSTAN MOTOR
DMD P.C.B

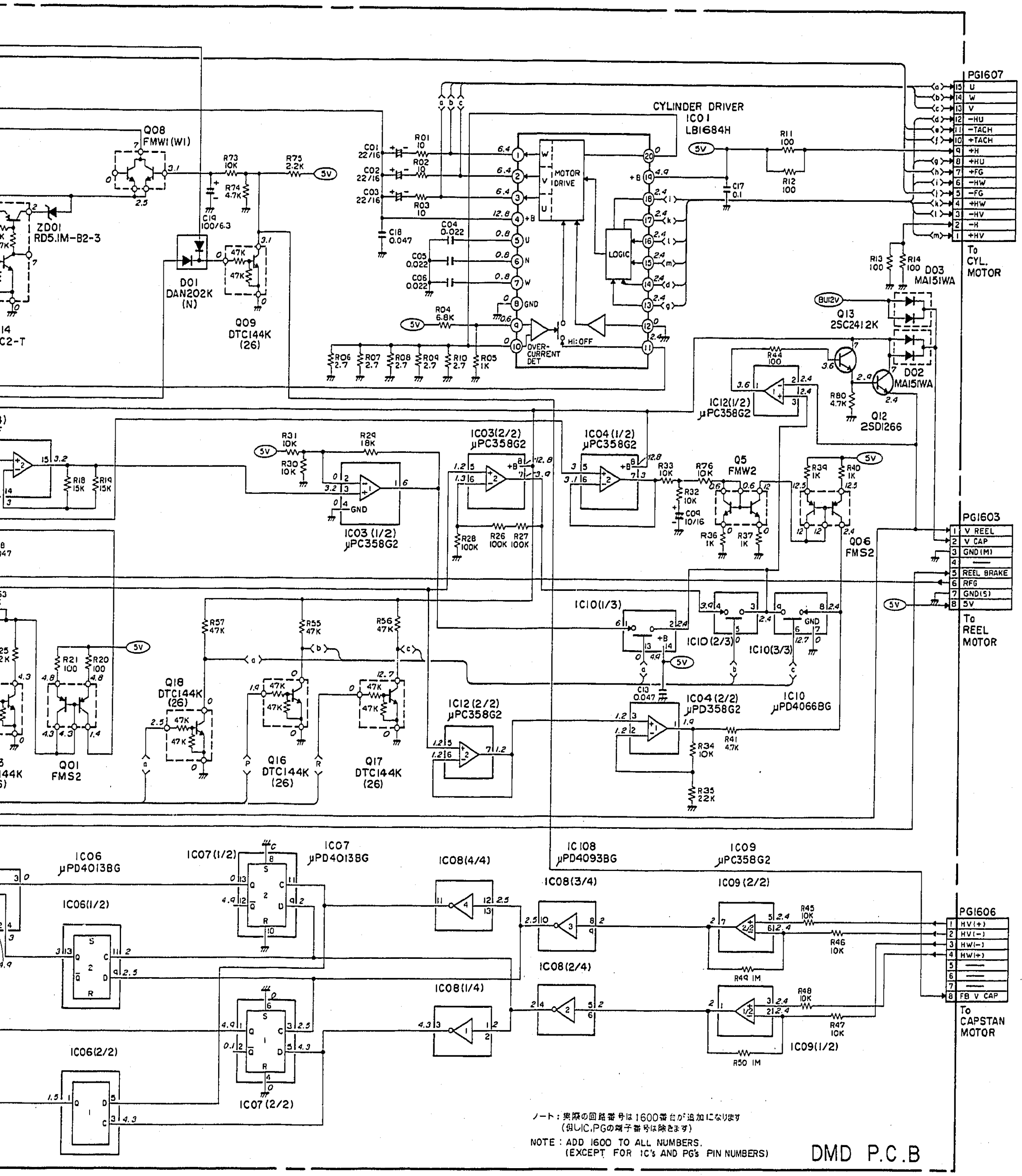
※ 電圧値1コ表示：PB又はRECモード
※ ONE VOLTAGE：PB OR REC MODE

ノート：実際の回路番号は1600番台が追加になります
（但しIC,PGの端子番号は除きます）
NOTE : ADD 1600 TO ALL NUMBERS.
(EXCEPT FOR IC's AND PG's PIN NUMBERS)

REG SCHEMATIC DIAG

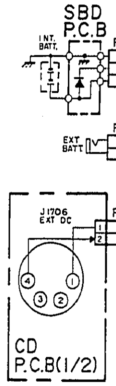

SBD P.C.B
INT BATT.
PG1824
GND
12V
EXT BATT
PG1829
J1706 EXT DC
PG1826
CD P.C.B(1/2)
D801 CTB-23L
FU801 3A
FU802 2A
L801 22μ
Q803 2SC2411
IC03, 04, 09, 12
Vcc
Vee
IC02
GND
IC05
NC
IC06
IC07
VDD
IC08

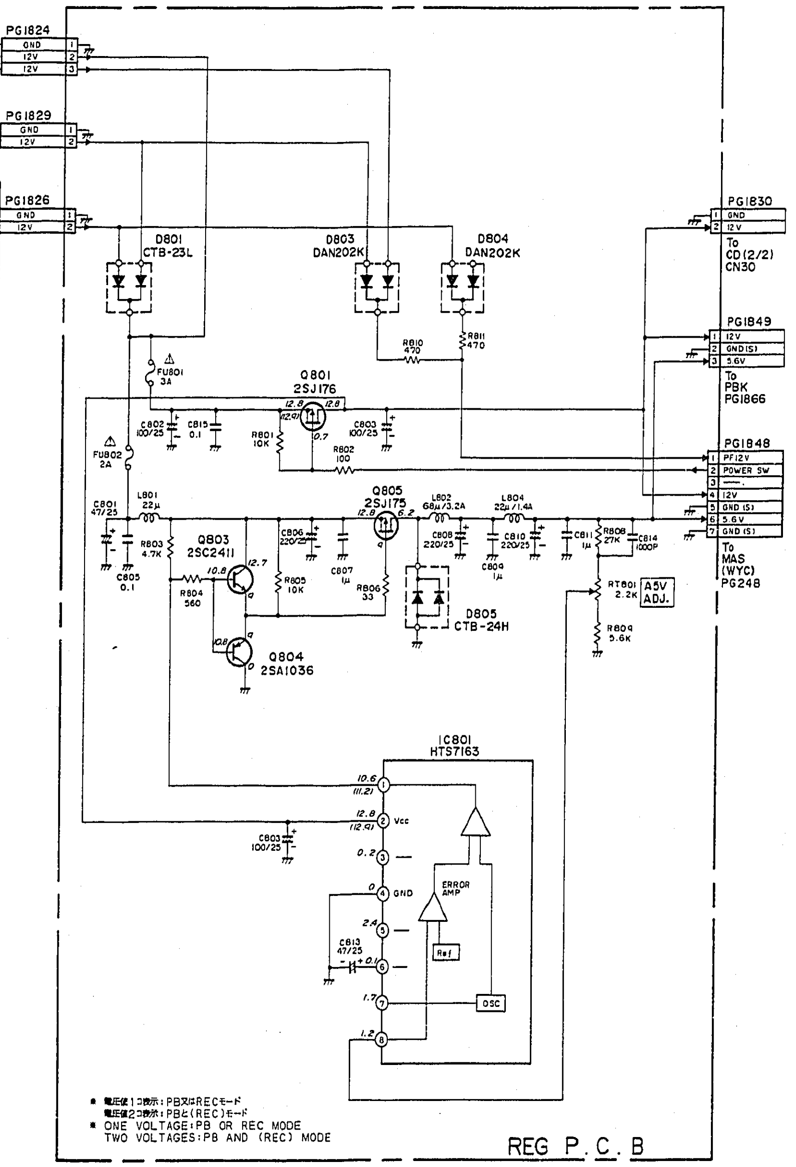
＊ 電圧値1コ表示：PB又はRECモード
電圧値2コ表示：PBと（REC）モード
＊ ONE VOLTAGE：PB OR REC MOD
TWO VOLTAGES：PB AND (REC


CYLINDER DRIVER
IC01
LB1684H
MOTOR DRIVE
LOGIC
OVER-CURRENT DET
HI: OFF
Q08
FMW1(W1)
ZD01
RD5.1M-B2-3
D01
DAN202K
(N)
Q09
DTC144K
(26)
Q13
2SC2412K
Q12
2SD1266
D02
MA151WA
D03
MA151WA
IC12(1/2)
μPC358G2
IC03(1/2)
μPC358G2
IC03(2/2)
μPC358G2
IC04(1/2)
μPC358G2
Q5
FMW2
Q06
FMS2
IC10(1/3)
IC10(2/3)
IC10(3/3)
IC10
μPD4066BG
IC04(2/2)
μPD358G2
IC12(2/2)
μPC358G2
Q18
DTC144K
(26)
Q16
DTC144K
(26)
Q17
DTC144K
(26)
Q01
FMS2
IC06
μPD4013BG
IC06(1/2)
IC06(2/2)
IC07(1/2)
IC07(2/2)
IC07
μPD4013BG
IC108
μPD4093BG
IC08(4/4)
IC08(3/4)
IC08(2/4)
IC08(1/4)
IC09
μPC358G2
IC09(2/2)
IC09(1/2)
PG1607
U
W
V
-HU
-TACH
+TACH
+H
+HU
+FG
-HW
-FG
+HW
+HV
-H
+HV
To CYL. MOTOR
PG1603
V REEL
V CAP
GND(M)
REEL BRAKE
RFG
GND(S)
5V
To REEL MOTOR
PG1606
HV(+)
HV(-)
HW(-)
HW(+)
FB V CAP
To CAPSTAN MOTOR
5V
BU12V
DMD P.C.B

ノート：実際の回路番号は1600番台が追加になります
（但しIC,PGの端子番号は除きます）
NOTE : ADD 1600 TO ALL NUMBERS.
(EXCEPT FOR IC's AND PG's PIN NUMBERS)

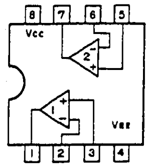
REG SCHEMATIC DIAGRAM


SBD
P.C.B
INT. BATT.
EXT BATT
J1706
EXT DC
CD
P.C.B(1/2)

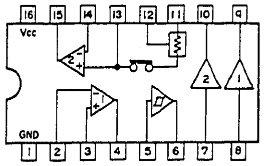

PG1824
GND
12V
12V
PG1829
GND
12V
PG1826
GND
12V
D801
CTB-23L
D803
DAN202K
D804
DAN202K
FU801
3A
FU802
2A
Q801
2SJ176
Q803
2SC2411
Q804
2SA1036
Q805
2SJ175
D805
CTB-24H
IC801
HTS7163
Vcc
GND
ERROR AMP
Ref
OSC
RT801
A5V ADJ.
PG1830
GND
12V
To CD(2/2) CN30
PG1849
12V
GND(S)
5.6V
To PBK PG1866
PG1848
PF12V
POWER SW
12V
GND(S)
5.6V
GND(S)
To MAS (WYC) PG248
REG P.C.B

※ 電圧値1つ表示：PBとRECモード
電圧値2つ表示：PBと(REC)モード
※ ONE VOLTAGE:PB OR REC MODE
TWO VOLTAGES:PB AND (REC) MODE

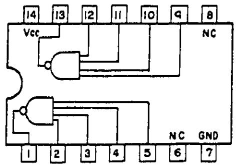
IC03, 04, 09, 12



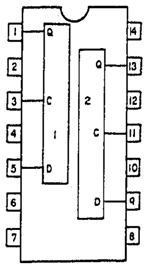
IC02



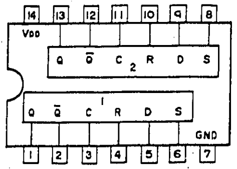
IC05


Vcc
NC
NC
GND

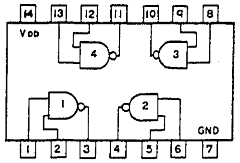
IC06



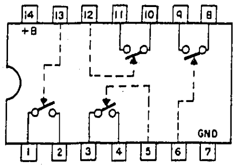
IC07



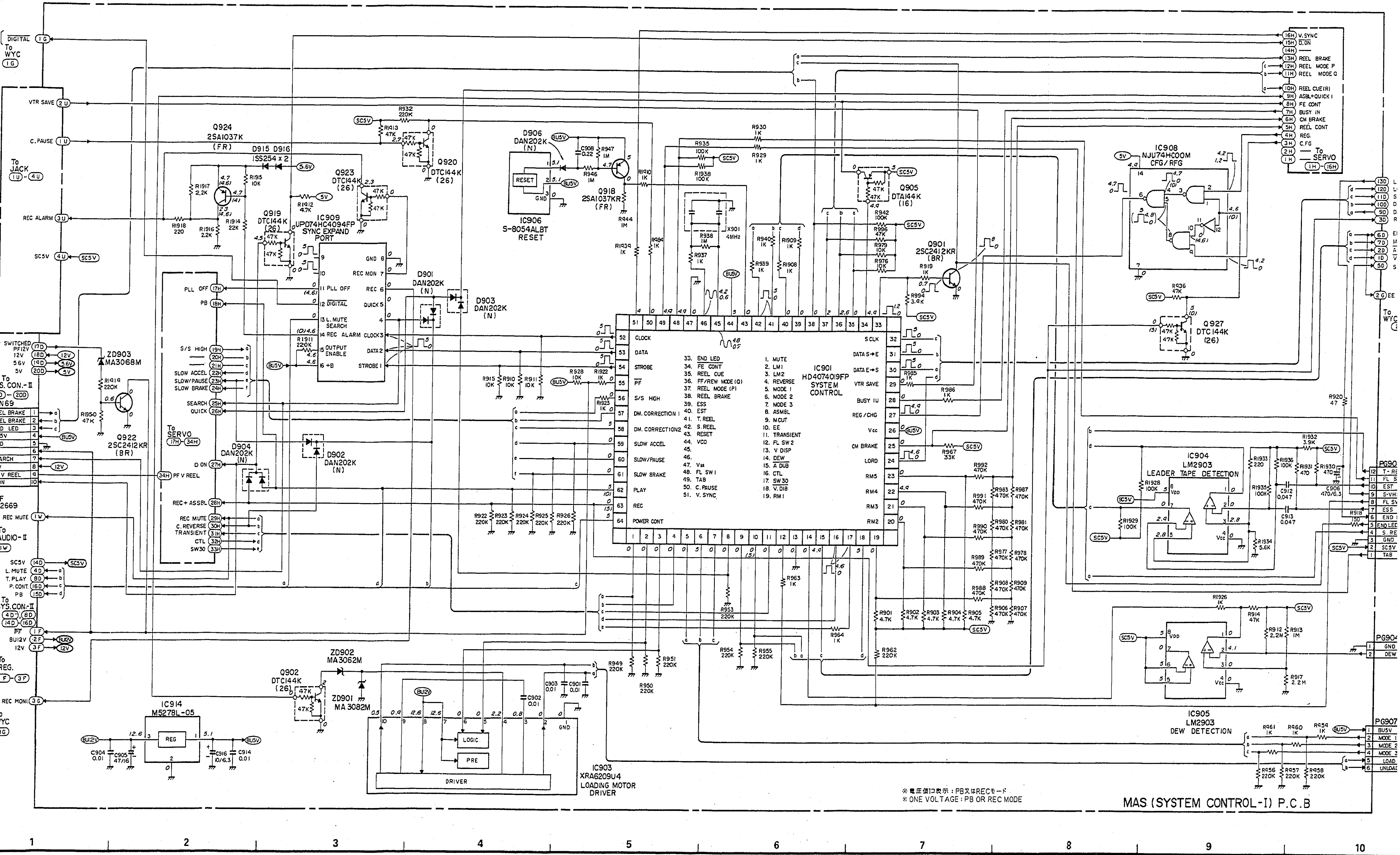
IC08



IC10

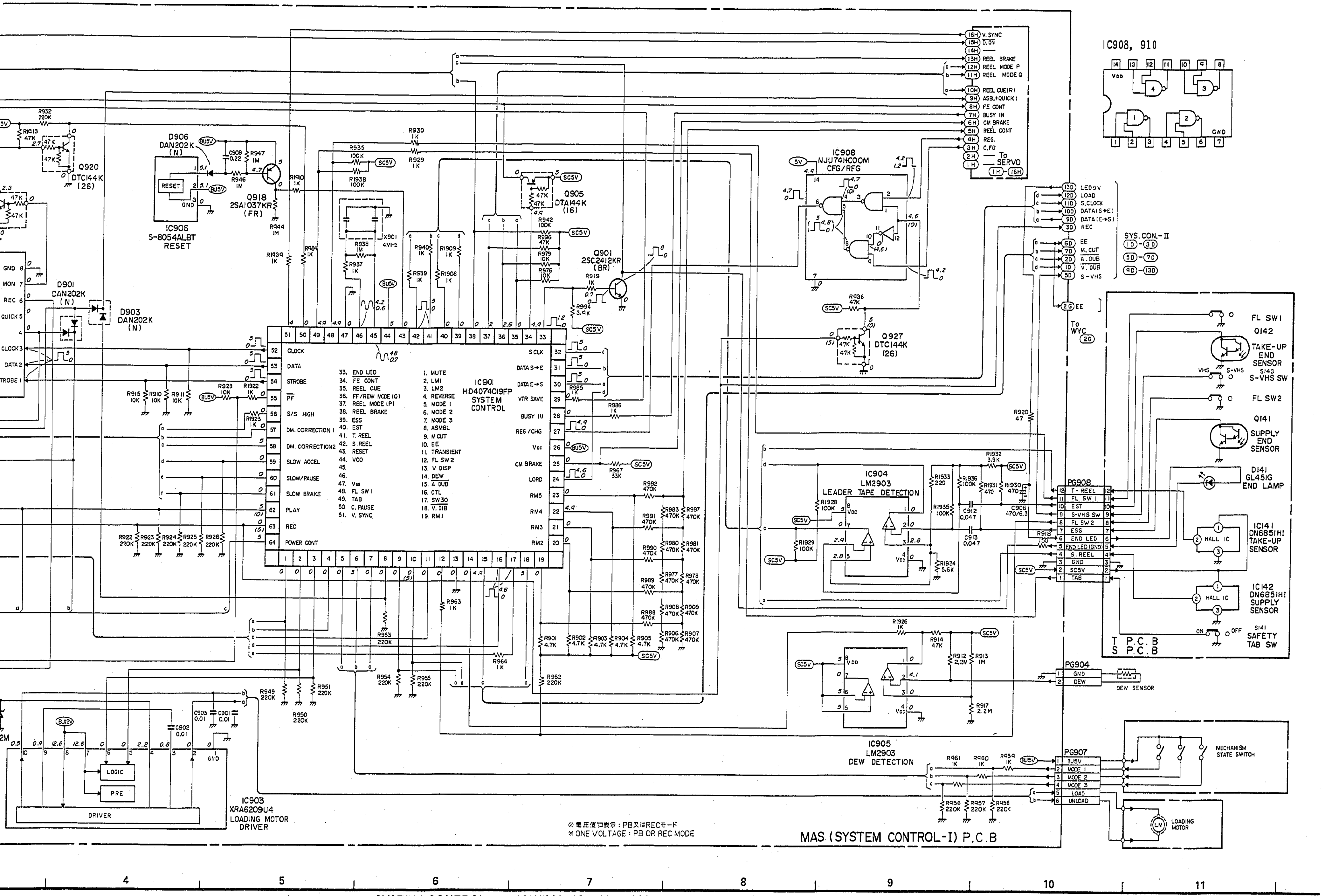


TEM CONTOROL- I SCHEMATIC DIAGRAM

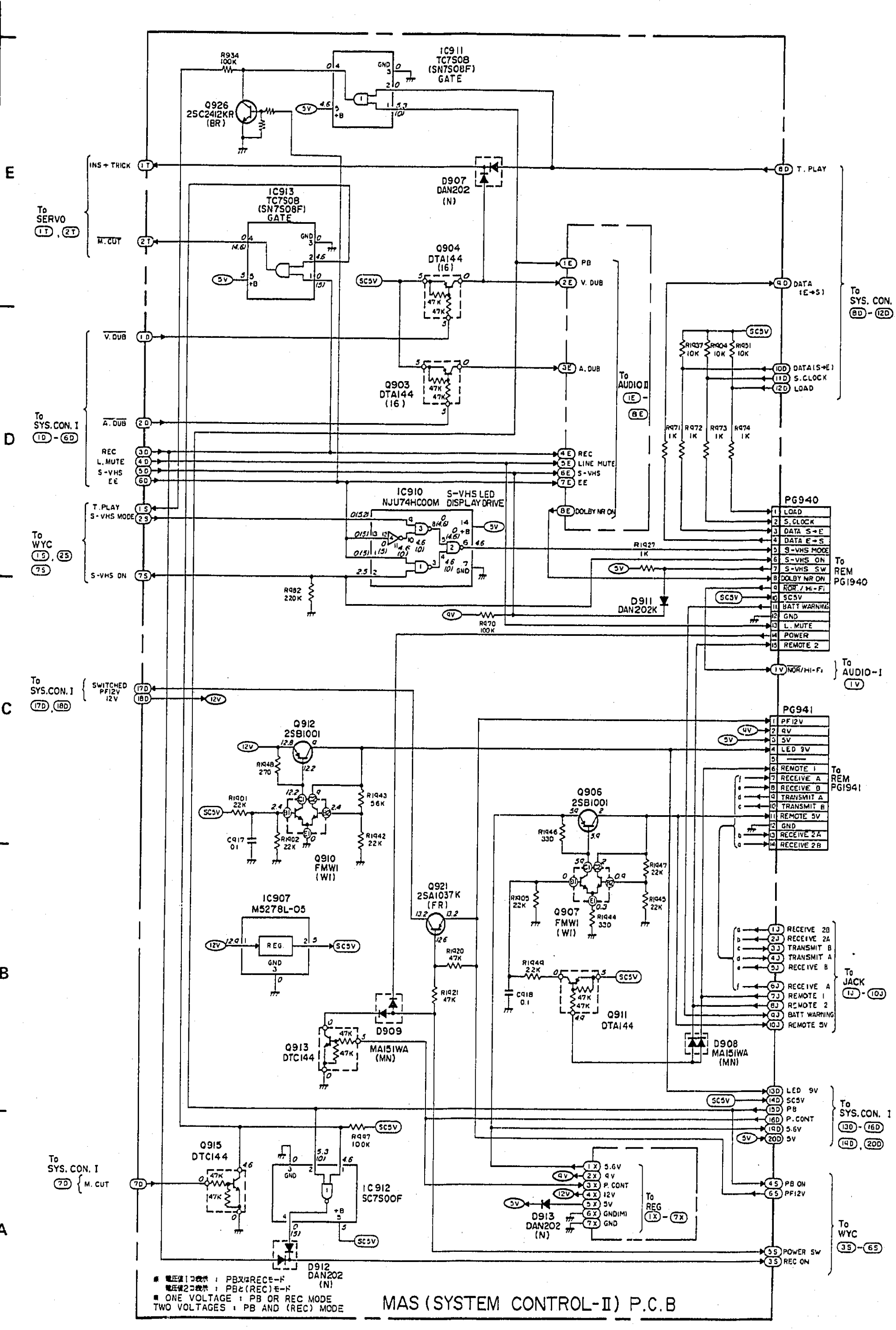


DIGITAL 1G
To WYC 1G
VTR SAVE 2U
C. PAUSE 1U
To JACK 1U-4U
REC ALARM 3U
SC5V 4U
Q924 2SA1037K (FR)
D915 D916 1SS254 x 2
R1917 2.2K
R1915 10K
R1918 220
R1916 2.2K
R1914 22K
R1912 4.7K
Q919 DTC144K (26)
IC909 UPD74HC4094FP SYNC EXPAND PORT
Q923 DTC144K (26)
R1913 47K
R932 220K
Q920 DTC144K (26)
D906 DAN202K (N)
RESET
GND
IC906 S-8054ALBT RESET
C908 0.22
R947 1M
R946 1M
Q918 2SA1037KR (FR)
R944 1M
R1910 1K
R1939 1K
R984 1K
R935 100K
R1938 100K
R930 1K
R929 1K
X901 4MHz
R938 1M
R937 1K
R940 1K
R1909 1K
R939 1K
R1908 1K
Q905 DTA144K (16)
R942 100K
R996 47K
R979 10K
R976 10K
Q901 2SC2412KR (BR)
R919 1K
R994 3.9K
PLL OFF 17H
PB 18H
11 PLL OFF
12 DIGITAL
13 L.MUTE SEARCH
14 REC ALARM
15 OUTPUT ENABLE
16 +B
GND 8
REC MON 7
REC 6
QUICK 5
CLOCK 3
DATA 2
STROBE 1
D901 DAN202K (N)
D903 DAN202K (N)
R1911 220K
S/S HIGH 19H
20H
21H
SLOW ACCEL 22H
SLOW/PAUSE 23H
SLOW BRAKE 24H
SEARCH 25H
QUICK 26H
To SERVO 17H-34H
D904 DAN202K (N)
D902 DAN202K (N)
D ON 27H
PF V REEL 34H
REC+ASSBL 28H
REC MUTE 29H
C. REVERSE 30H
TRANSIENT 31H
CTL 32H
SW30 33H
SWITCHED PF12V 17D
12V 18D
5.6V 19D
5V 20D
To S. CON.-II 17D-20D
N69
ZD903 MA3068M
R1919 220K
R1950 47K
Q922 2SC2412KR (BR)
REC MUTE 1W
To AUDIO-II 1W
SC5V 14D
L.MUTE 4D
T.PLAY 8D
P.CONT 16D
PB 15D
To SYS.CON.-II 4D, 8D, 14D, 16D
PF 1F
BU12V 2F
12V 3F
To REG. 1F-3F
REC MONI 3G
To WYC 1G
IC914 M5278L-05
REG
C904 0.01
C905 47/16
C916 10/6.3
C914 0.01
Q902 DTC144K (26)
ZD902 MA3062M
ZD901 MA3082M
C903 0.01
C901 0.01
C902 0.01
LOGIC
PRE
DRIVER
GND
IC903 XRA6209U4 LOADING MOTOR DRIVER
R949 220K
R950 220K
R951 220K
R954 220K
R955 220K
R953 220K
R963 1K
R964 1K
R962 220K
R915 10K
R910 10K
R911 10K
R928 10K
R1922 1K
R1923 1K
R922 220K
R923 220K
R924 220K
R925 220K
R926 220K
IC901 HD404019FP SYSTEM CONTROL
52 CLOCK
53 DATA
54 STROBE
55 PF
56 S/S HIGH
57 DM. CORRECTION 1
58 DM. CORRECTION2
59 SLOW ACCEL
60 SLOW/PAUSE
61 SLOW BRAKE
62 PLAY
63 REC
64 POWER CONT
33. END LED
34. FE CONT
35. REEL CUE
36. FF/REW MODE (Q)
37. REEL MODE (P)
38. REEL BRAKE
39. ESS
40. EST
41. T. REEL
42. S. REEL
43. RESET
44. VCO
45.
46.
47. Vss
48. FL SW1
49. TAB
50. C. PAUSE
51. V. SYNC
1. MUTE
2. LM1
3. LM2
4. REVERSE
5. MODE 1
6. MODE 2
7. MODE 3
8. ASMBL
9. MCUT
10. EE
11. TRANSIENT
12. FL SW2
13. V DISP
14. DEW
15. A DUB
16. CTL
17. SW30
18. V. DIB
19. RM1
SCLK 32
DATA S→E 31
DATA E→S 30
VTR SAVE 29
BUSY 1U 28
REG/CHG 27
Vcc 26
CM BRAKE 25
LORD 24
RM5 23
RM4 22
RM3 21
RM2 20
R985 1K
R986 1K
R967 33K
R992 470K
R991 470K
R990 470K
R989 470K
R988 470K
R983 470K
R987 470K
R980 470K
R981 470K
R977 470K
R978 470K
R908 470K
R909 470K
R906 470K
R907 470K
R901 4.7K
R902 4.7K
R903 4.7K
R904 4.7K
R905 4.7K
16H V.SYNC
15H D.ON
14H
13H REEL BRAKE
12H REEL MODE P
11H REEL MODE Q
10H REEL CUE(R)
9H ASBL+QUICK I
8H FE CONT
7H BUSY IN
6H CM BRAKE
5H REEL CONT
4H REG.
3H C.FG
2H
1H
To SERVO 1H-16H
IC908 NJU74HC00M CFG/RFG
R936 47K
Q927 DTC144K (26)
IC904 LM2903 LEADER TAPE DETECTION
R1928 100K
R1929 100K
R1933 220
R1936 100K
R1931 470
R1930 470
R1932 3.9K
R1935 100K
C912 0.047
C913 0.047
C906 470/6.3
R1934 5.6K
R920 47
R918 150
PG90
12 T-RE
11 FL S
10 EST
9 S-VHS
8 FL SV
7 ESS
6 END L
5 END LED
4 S. RE
3 GND
2 SC5V
1 TAB
R1926 1K
R914 47K
R912 2.2M
R913 1M
R917 2.2M
IC905 LM2903 DEW DETECTION
PG904
1 GND
2 DEW
R961 1K
R960 1K
R959 1K
R956 220K
R957 220K
R958 220K
PG907
1 BU5V
2 MODE 1
3 MODE 2
4 MODE 3
5 LOAD
6 UNLOAD
To WYC
※電圧値は表示：PB又はRECモード
※ONE VOLTAGE: PB OR REC MODE
MAS (SYSTEM CONTROL-I) P.C.B
1
2
3
4
5
6
7
8
9
10

M

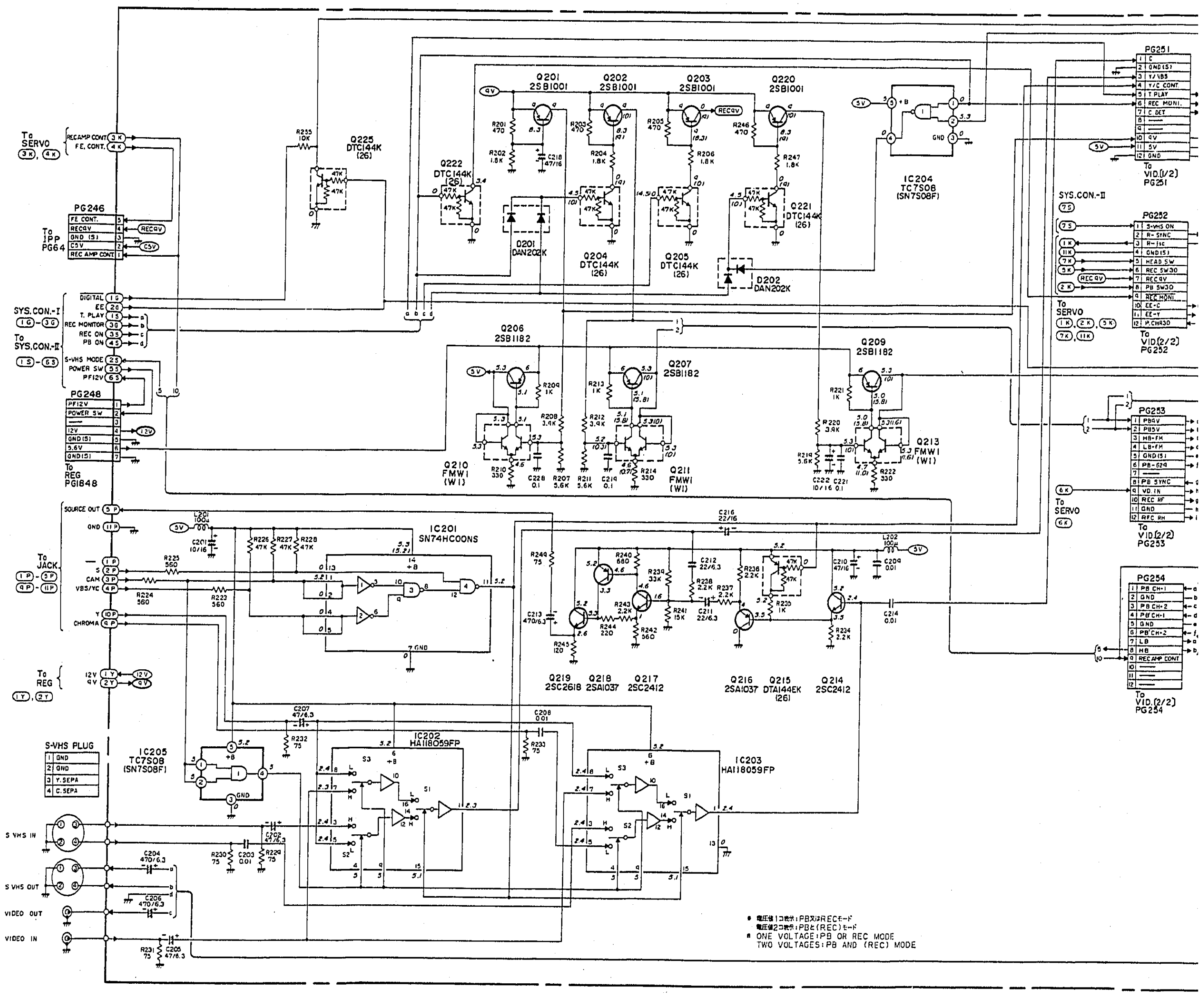

IC901
HD404019FP
SYSTEM CONTROL
1. MUTE
2. LM1
3. LM2
4. REVERSE
5. MODE 1
6. MODE 2
7. MODE 3
8. ASMBL
9. M.CUT
10. EE
11. TRANSIENT
12. FL SW 2
13. V DISP
14. DEW
15. A DUB
16. CTL
17. SW30
18. V. DIB
19. RM1
33. END LED
34. FE CONT
35. REEL CUE
36. FF/REW MODE (Q)
37. REEL MODE (P)
38. REEL BRAKE
39. ESS
40. EST
41. T. REEL
42. S. REEL
43. RESET
44. VCO
47. Vss
48. FL SW1
49. TAB
50. C. PAUSE
51. V. SYNC
CLOCK
DATA
STROBE
PF
S/S HIGH
DM. CORRECTION 1
DM. CORRECTION2
SLOW ACCEL
SLOW/PAUSE
SLOW BRAKE
PLAY
REC
POWER CONT
S CLK
DATA S→E
DATA E→S
VTR SAVE
BUSY IU
REG/CHG
Vcc
CM BRAKE
LORD
RM5
RM4
RM3
RM2
IC906
S-8054ALBT
RESET
D906
DAN202K
(N)
Q918
2SA1037KR
(FR)
Q920
DTC144K
(26)
D901
DAN202K
(N)
D903
DAN202K
(N)
X901
4MHz
Q905
DTA144K
(16)
Q901
2SC2412KR
(BR)
IC908
NJU74HC00M
CFG/RFG
Q927
DTC144K
(26)
IC908, 910
VDD
GND
16H V. SYNC
15H D. ON
14H —
13H REEL BRAKE
12H REEL MODE P
11H REEL MODE Q
10H REEL CUE(R)
9H ASBL+QUICK I
8H FE CONT
7H BUSY IN
6H CM BRAKE
5H REEL CONT
4H REG.
3H C.FG
2H — To
1H — SERVO
(1H)-(16H)
13D LED9V
12D LOAD
11D S.CLOCK
10D DATA(S→E)
9D DATA(E→S)
3D REC
6D EE
7D M. CUT
2D A. DUB
1D V. DUB
5D S-VHS
SYS. CON.-II
(1D)-(3D)
(5D)-(7D)
(9D)-(13D)
2G EE
To WYC
(2G)
IC904
LM2903
LEADER TAPE DETECTION
IC905
LM2903
DEW DETECTION
IC903
XRA6209U4
LOADING MOTOR DRIVER
LOGIC
PRE
DRIVER
PG908
T-REEL
FL SW 1
EST
S-VHS SW
FL SW 2
ESS
END LED
END LED (GND)
S. REEL
GND
SC5V
TAB
PG904
GND
DEW
DEW SENSOR
PG907
BU5V
MODE 1
MODE 2
MODE 3
LOAD
UNLOAD
FL SW1
Q142
TAKE-UP END SENSOR
S143
S-VHS SW
FL SW2
Q141
SUPPLY END SENSOR
D141
GL451G
END LAMP
IC141
DN6851HI
TAKE-UP SENSOR
IC142
DN6851HI
SUPPLY SENSOR
HALL IC
S141
SAFETY TAB SW
ON
OFF
T P.C.B
S P.C.B
MECHANISM STATE SWITCH
LOADING MOTOR
※電圧値表示：PB又はRECモード
※ONE VOLTAGE : PB OR REC MODE
MAS (SYSTEM CONTROL-I) P.C.B
4
5
6
7
8
9
10
11

SYSTEM CONTOROL-Ⅱ SCHEMATIC DIAGRAM


IC911 TC7S08 (SN7S08F) GATE
Q926 2SC2412KR (BR)
IC913 TC7S08 (SN7S08F) GATE
D907 DAN202 (N)
Q904 DTA144 (16)
Q903 DTA144 (16)
IC910 NJU74HC00M S-VHS LED DISPLAY DRIVE
D911 DAN202K
PG940
PG941
Q912 2SB1001
Q910 FMW1 (W1)
IC907 M5278L-05
Q906 2SB1001
Q907 FMW1 (W1)
Q921 2SA1037K (FR)
Q911 DTA144
D909 MA151WA (MN)
D908 MA151WA (MN)
Q913 DTC144
Q915 DTC144
IC912 SC7S00F
D913 DAN202 (N)
D912 DAN202 (N)
To SERVO
To SYS.CON. I
To WYC
To AUDIO II
To REM PG1940
To REM PG1941
To AUDIO-I
To JACK
To REG
MAS (SYSTEM CONTROL-Ⅱ) P.C.B

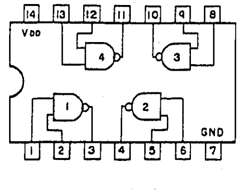
● 電圧値1つ表示：PBX/RECモード
電圧値2つ表示：PBと(REC)モード
● ONE VOLTAGE : PB OR REC MODE
TWO VOLTAGES : PB AND (REC) MODE

WYC SCHEMATIC DIAGRAM

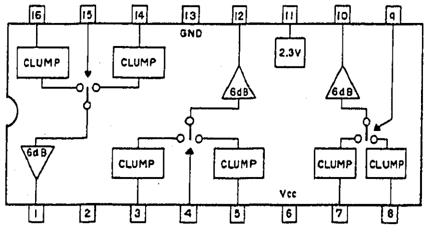

Q201 2SB1001
Q202 2SB1001
Q203 2SB1001
Q220 2SB1001
Q225 DTC144K (26)
Q222 DTC144K (26)
D201 DAN202K
Q204 DTC144K (26)
Q205 DTC144K (26)
Q221 DTC144K (26)
D202 DAN202K
IC204 TC7S08 (SN7S08F)
PG251
PG252
PG253
PG254
PG246
PG248
Q206 2SB1182
Q207 2SB1182
Q209 2SB1182
Q210 FMW1 (W1)
Q211 FMW1 (W1)
Q213 FMW1 (W1)
IC201 SN74HC00NS
Q219 2SC2618
Q218 2SA1037
Q217 2SC2412
Q216 2SA1037
Q215 DTA144EK (26)
Q214 2SC2412
IC205 TC7S08 (SN7S08F)
IC202 HA118059FP
IC203 HA118059FP
S-VHS PLUG
S VHS IN
S VHS OUT
VIDEO OUT
VIDEO IN
To SERVO
To IPP PG64
To SYS.CON.-I
To SYS.CON.-II
To REG PG1848
To JACK
To REG
To VID (1/2) PG251
To VID (2/2) PG252
To VID (2/2) PG253
To VID (2/2) PG254

● 電圧値1つ表示：PBX/RECモード
電圧値2つ表示：PBと(REC)モード
● ONE VOLTAGE : PB OR REC MODE
TWO VOLTAGES : PB AND (REC) MODE

IC201

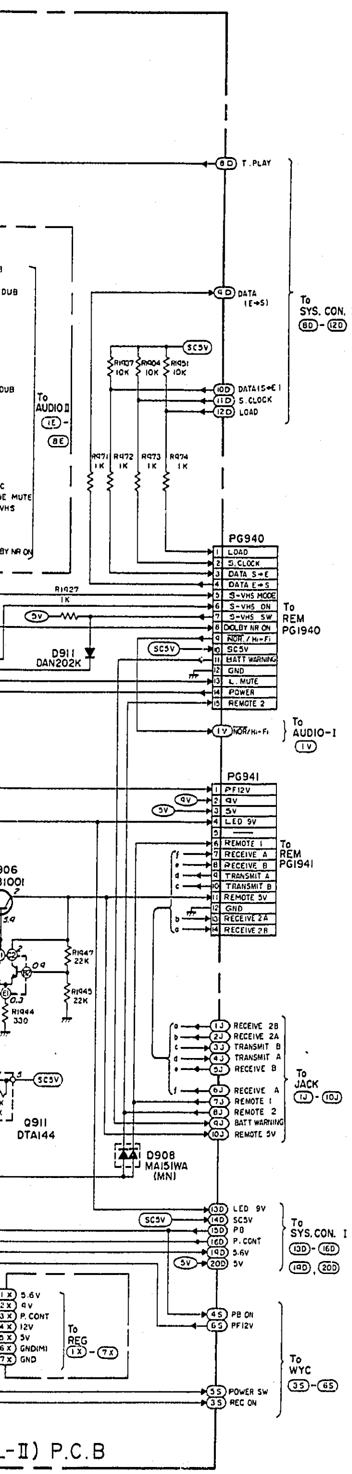

Vdd
GND
1
2
3
4

IC202, 203


GND
Vcc
CLUMP
2.3V
6dB

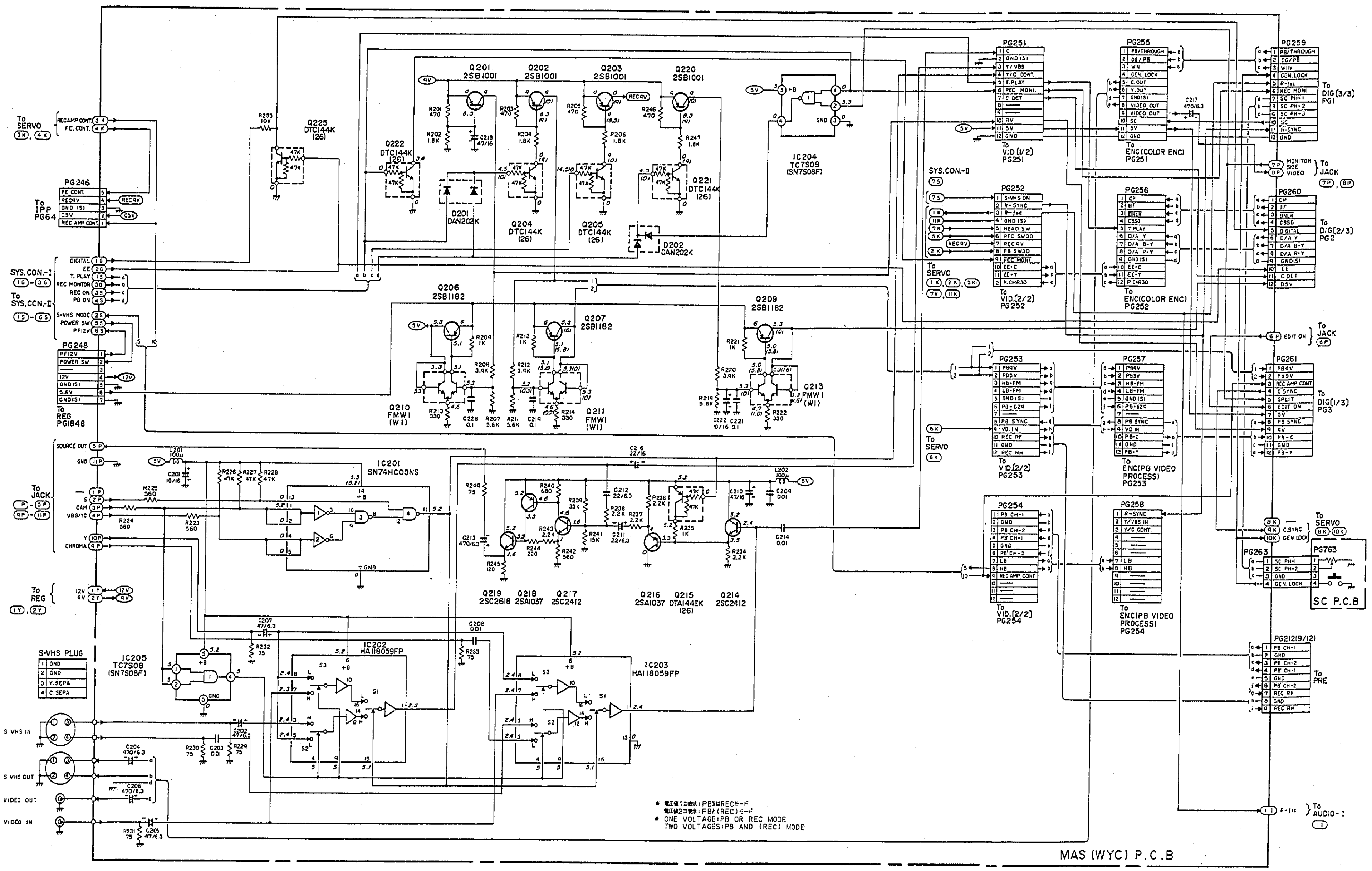
1 2 3 4 5 6 7 8 9 10

RAM



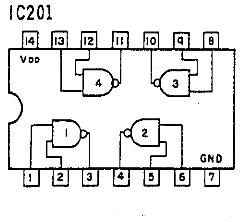
T. PLAY
DATA (E→S)
To SYS. CON. I (8D)-(12D)
DATA(S←E)
S. CLOCK
LOAD
To AUDIO II
PG940
To REM PG1940
D911 DAN202K
To AUDIO-I (1V)
PG941
To REM PG1941
To JACK (1J)-(10J)
Q911 DTA144
D908 MA151WA (MN)
To SYS. CON. I (13D)-(16D) (19D), (20D)
To REG (1X)-(7X)
To WYC (3S)-(6S)
-II) P.C.B

WYC SCHEMATIC DIAGRAM



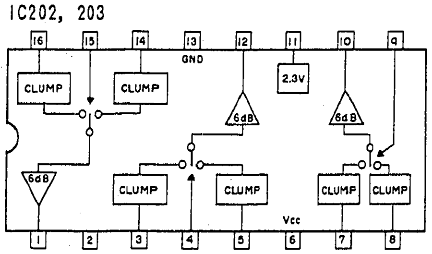
To SERVO (3K), (4K)
PG246
To IPP PG64
SYS. CON.-I (1G)-(3G)
To SYS. CON.-II (1S)-(6S)
PG248
To REG PG1848
To JACK (1P)-(5P) (9P)-(11P)
To REG (1Y), (2Y)
S-VHS PLUG
S VHS IN
S VHS OUT
VIDEO OUT
VIDEO IN
Q201 2SB1001
Q202 2SB1001
Q203 2SB1001
Q220 2SB1001
Q225 DTC144K (26)
Q222 DTC144K (26)
D201 DAN202K
Q204 DTC144K (26)
Q205 DTC144K (26)
D202 DAN202K
Q221 DTC144K (26)
IC204 TC7S08 (SN7S08F)
Q206 2SB1162
Q207 2SB1162
Q209 2SB1162
Q210 FMW1 (W1)
Q211 FMW1 (W1)
Q213 FMW1 (W1)
IC201 SN74HC00NS
Q219 2SC2618
Q218 2SA1037
Q217 2SC2412
Q216 2SA1037
Q215 DTA144EK (26)
Q214 2SC2412
IC205 TC7S08 (SN7S08F)
IC202 HA118059FP
IC203 HA118059FP
PG251
To VID(1/2) PG251
SYS.CON.-II (7S)
PG252
To SERVO (1K), (2K), (5K) (7K), (11K)
To VID(2/2) PG252
PG253
To SERVO (6K)
To VID(2/2) PG253
PG254
To VID(2/2) PG254
PG255
To ENC(COLOR ENC) PG251
PG256
To ENC(COLOR ENC) PG252
PG257
To ENC(PB VIDEO PROCESS) PG253
PG258
To ENC(PB VIDEO PROCESS) PG254
PG259
To DIG(3/3) PG1
MONITOR SIZE VIDEO
To JACK (7P), (8P)
PG260
To DIG(2/3) PG2
EDIT ON
To JACK (6P)
PG261
To DIG(1/3) PG3
To SERVO (8K) (10K)
PG263
PG763
SC P.C.B
PG212(9/12)
To PRE
To AUDIO-I (1I)
● 電圧値1つ表示：PB又はRECモード
電圧値2つ表示：PB(REC)モード
● ONE VOLTAGE:PB OR REC MODE
TWO VOLTAGES:PB AND (REC) MODE
MAS (WYC) P.C.B

IC201



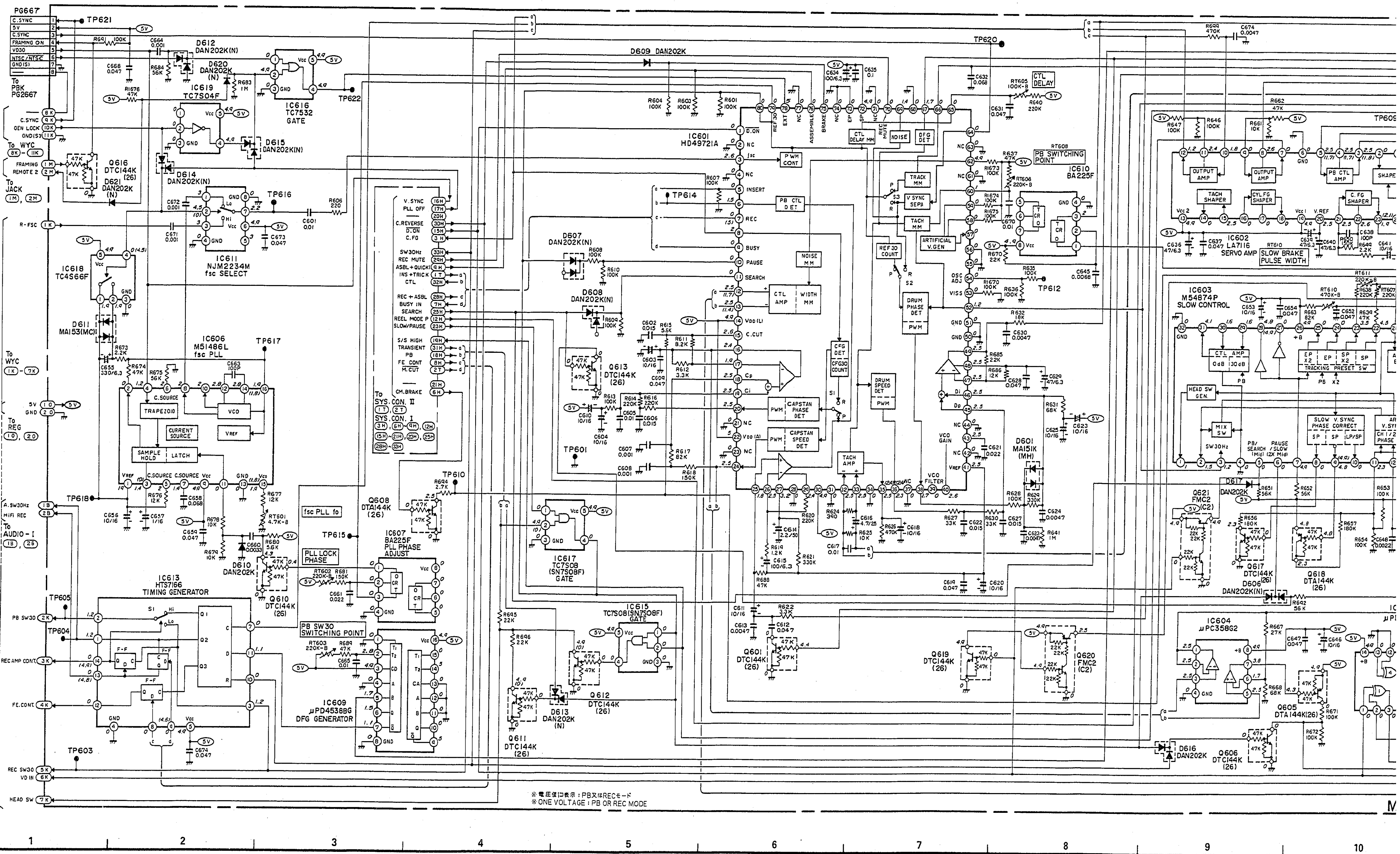
14 13 12 11 10 9 8
VDD
4
3
1
2
GND
1 2 3 4 5 6 7

IC202, 203

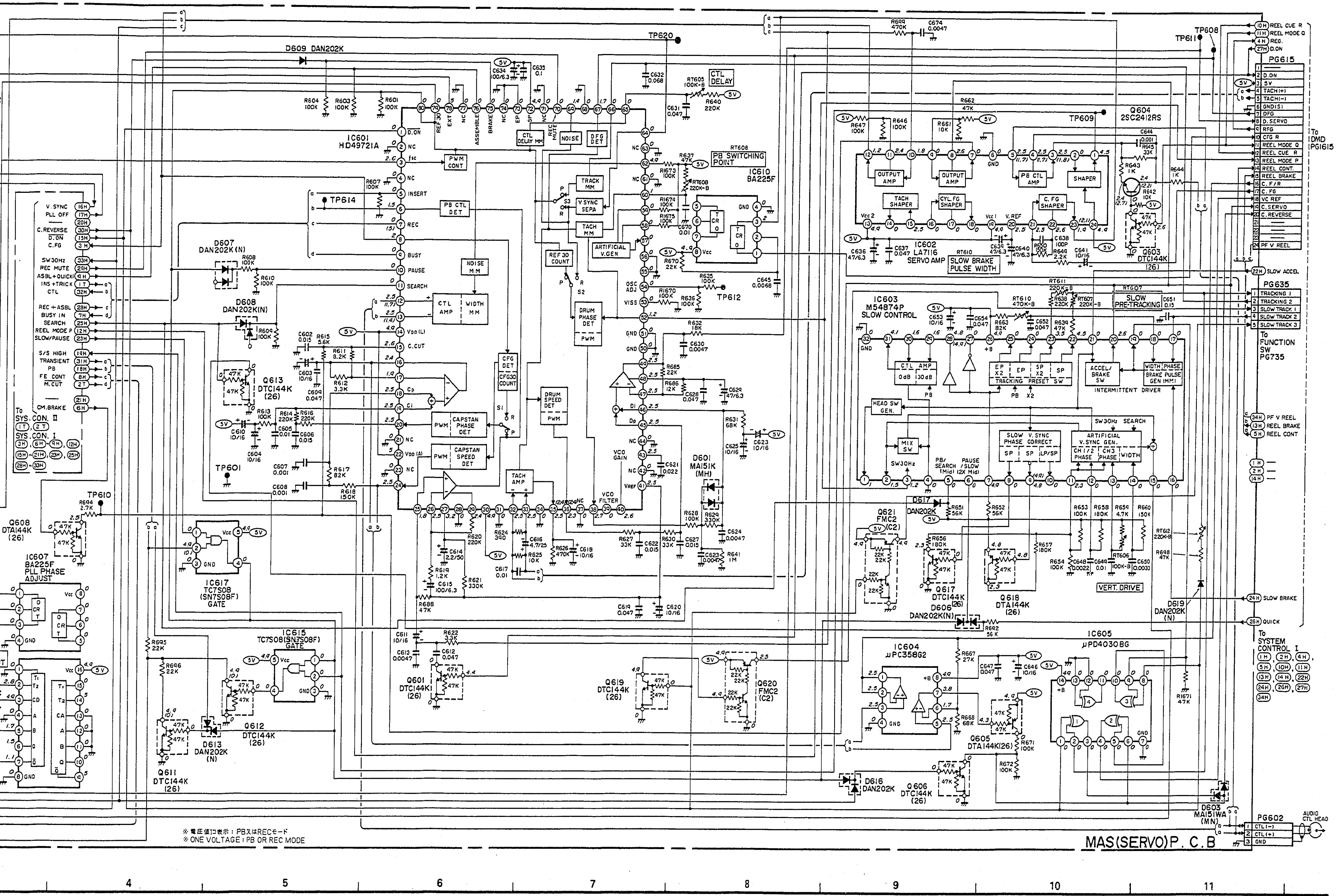


16 15 14 13 12 11 10 9
GND
CLUMP
CLUMP
6dB
2.3V
6dB
6dB
CLUMP
CLUMP
CLUMP
CLUMP
Vcc
1 2 3 4 5 6 7 8

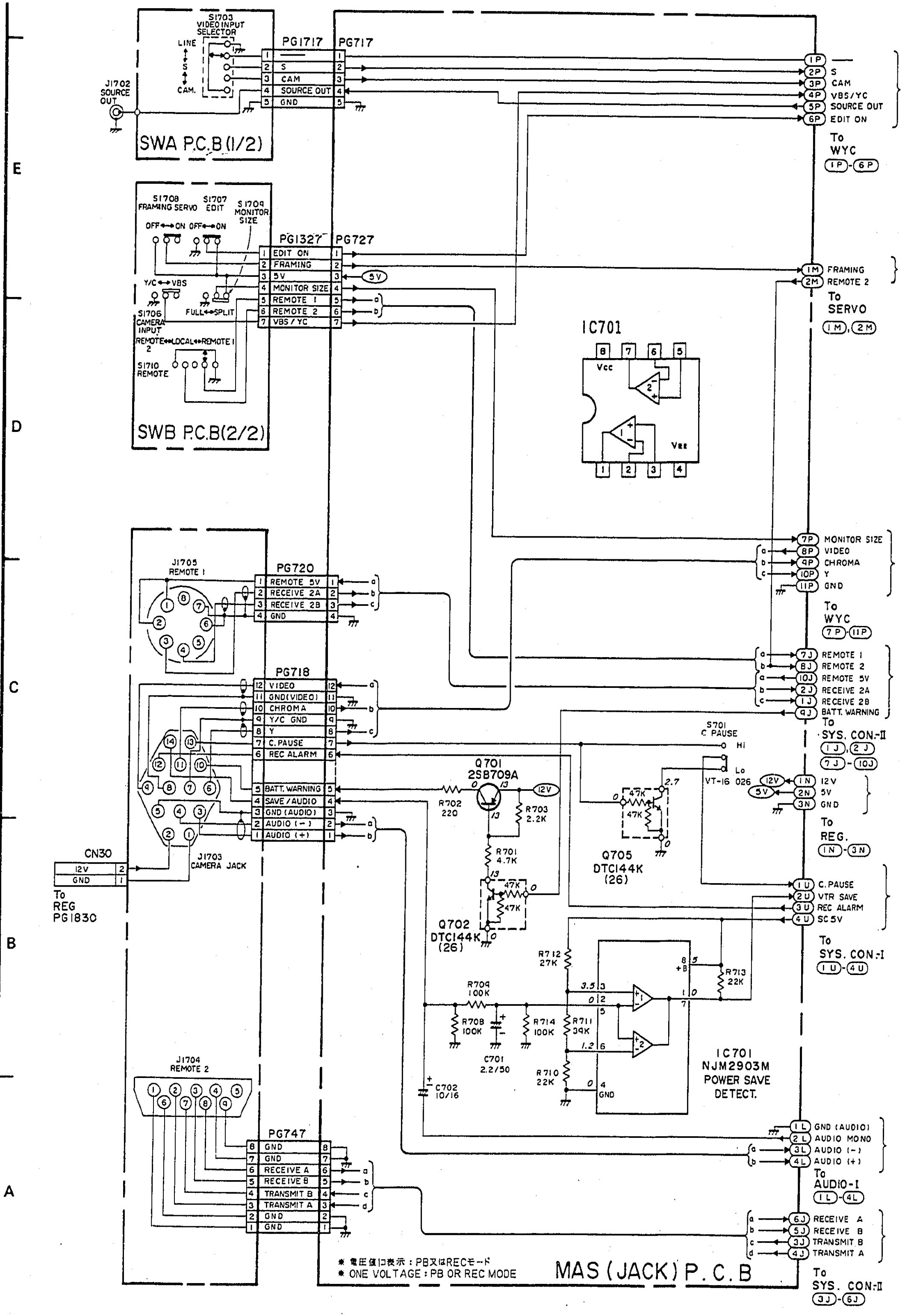
VO SCHEMATIC DIAGRAM


PG667
C.SYNC
5V
C.SYNC
FRAMING ON
VD30
NTSC/NTSC
GND(S)
TP621
To PBK PG2667
C.SYNC
GEN LOCK
GND(S)
To WYC
FRAMING
REMOTE 2
To JACK
R-FSC
To WYC
To REG
A.SW30Hz
HiFi REC
To AUDIO-I
PB SW30
RECAMP CONT
FE.CONT.
REC SW30
VD IN
HEAD SW
D612 DAN202K(N)
D620 DAN202K (N)
IC619 TC7S04F
IC616 TC7S32 GATE
TP622
D615 DAN202K(N)
D614 DAN202K(N)
Q616 DTC144K (26)
D621 DAN202K (N)
IC611 NJM2234M fsc SELECT
TP616
IC618 TC4S66F
D611 MA153(MC)
IC606 M51486L fsc PLL
TP617
TRAPEZOID
VCO
CURRENT SOURCE
VREF
SAMPLE HOLD
LATCH
TP618
D610 DAN202K
Q610 DTC144K (26)
IC613 HTS7166 TIMING GENERATOR
TP605
TP604
TP603
F-F
fsc PLL fo
PLL LOCK PHASE
IC607 BA225F PLL PHASE ADJUST
TP615
Q608 DTA144K (26)
TP610
PB SW30 SWITCHING POINT
IC609 µPD4538BG DFG GENERATOR
V.SYNC
PLL OFF
C.REVERSE
D.ON
C.FG
SW30Hz
REC MUTE
ASBL+QUICK
INS+TRICK
CTL
REC+ASBL
BUSY IN
SEARCH
REEL MODE P
SLOW/PAUSE
S/S HIGH
TRANSIENT
PB
FE CONT
M.CUT
CM.BRAKE
To SYS.CON. II
SYS.CON. I
D607 DAN202K(N)
D608 DAN202K(N)
Q613 DTC144K (26)
TP601
TP614
IC617 TC7S08 (SN7S08F) GATE
Q611 DTC144K (26)
D613 DAN202K (N)
Q612 DTC144K (26)
IC615 TC7S08(SN7S08F) GATE
D609 DAN202K
TP620
IC601 HD49721A
REF30
EXT
ASSEMBLE
BRAKE
REC MUTE
D.ON
INSERT
REC
BUSY
PAUSE
SEARCH
C.CUT
PWM CONT
PB CTL DET
NOISE MM
CTL AMP
WIDTH MM
CFG DET
CFG30 COUNT
CAPSTAN PHASE DET
CAPSTAN SPEED DET
DRUM SPEED DET
TACH AMP
DRUM PHASE DET
PWM
REF30 COUNT
TRACK MM
V SYNC SEPA
TACH MM
ARTIFICIAL V.GEN
CTL DELAY MM
NOISE
DFG DET
CTL DELAY
PB SWITCHING POINT
IC610 BA225F
TP612
D601 MA151K (MH)
Q601 DTC144K (26)
Q619 DTC144K (26)
Q620 FMC2 (C2)
IC602 LA7116 SERVO AMP
SLOW BRAKE PULSE WIDTH
OUTPUT AMP
TACH SHAPER
CYL FG SHAPER
PB CTL AMP
C.FG SHAPER
SHAPE
TP609
IC603 M54874P SLOW CONTROL
CTL AMP
TRACKING PRESET SW
HEAD SW GEN.
MIX SW
SLOW V.SYNC PHASE CORRECT
D617 DAN202K
Q621 FMC2 (C2)
Q617 DTC144K (26)
Q618 DTA144K (26)
D606 DAN202K(N)
IC604 µPC358G2
Q605 DTA144K(26)
D616 DAN202K
Q606 DTC144K (26)
1
2
3
4
5
6
7
8
9
10

※電圧値1コ表示：PB又はRECモード
※ONE VOLTAGE : PB OR REC MODE

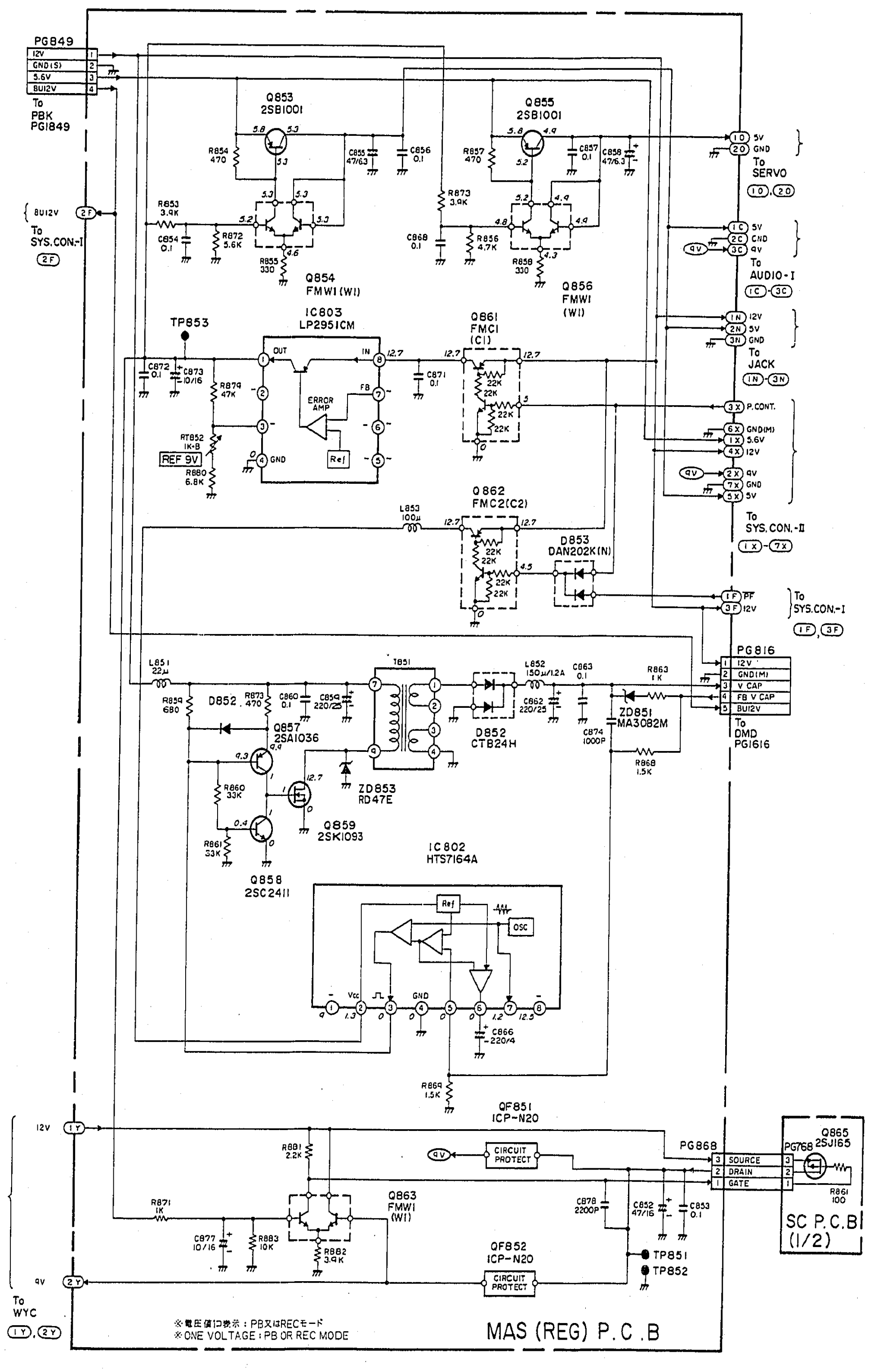

IC601
HD49721A
IC602
LA7116
SERVO AMP
IC603
M54874P
SLOW CONTROL
IC604
μPC358C2
IC605
μPD4030BG
IC607
BA225F
PLL PHASE ADJUST
IC610
BA225F
IC615
TC7S08(SN7S08F)
GATE
IC617
TC7S08
(SN7S08F)
GATE
Q601
DTC144K
Q603
DTC144K
Q604
2SC2412RS
Q605
DTA144K
Q606
DTC144K
Q608
DTA144K
Q611
DTC144K
Q612
DTC144K
Q613
DTC144K
Q617
DTC144K
Q618
DTA144K
Q619
DTC144K
Q620
FMC2
Q621
FMC2
D601
MA151K
D603
MA151WA
D606
DAN202K(N)
D607
DAN202K(N)
D608
DAN202K(N)
D609 DAN202K
D613
DAN202K
D616
DAN202K
D617
DAN202K
D619
DAN202K
TP601
TP608
TP609
TP610
TP611
TP612
TP614
TP620
RT605
RT606
RT607
RT608
PB SWITCHING POINT
RT610
RT611
RT612
CTL DELAY
SLOW BRAKE PULSE WIDTH
SLOW PRE-TRACKING
VERT. DRIVE
PG602
AUDIO CTL HEAD
PG615
To DMD PG1615
PG635
To FUNCTION SW PG735
To SYSTEM CONTROL I
To SYS. CON. II
SYS. CON. I
MAS(SERVO)P. C. B
※ 電圧値は表示：PB又はRECモード
※ ONE VOLTAGE : PB OR REC MODE
4
5
6
7
8
9
10
11

JACK SCHEMATIC DIAGRAM


S1703 VIDEO INPUT SELECTOR
LINE
CAM.
J1702 SOURCE OUT
PG1717
PG717
S
CAM
SOURCE OUT
GND
SWA P.C.B (1/2)
To WYC (1P)-(6P)
S1708 FRAMING SERVO
S1707 EDIT
S1709 MONITOR SIZE
PG1327
PG727
EDIT ON
FRAMING
5V
MONITOR SIZE
REMOTE 1
REMOTE 2
VBS / YC
S1706 CAMERA INPUT
S1710 REMOTE
SWB P.C.B(2/2)
FRAMING
REMOTE 2
To SERVO (1M),(2M)
IC701
J1705 REMOTE 1
PG720
REMOTE 5V
RECEIVE 2A
RECEIVE 2B
GND
MONITOR SIZE
VIDEO
CHROMA
Y
GND
To WYC (7P)-(11P)
PG718
VIDEO
GND(VIDEO)
CHROMA
Y/C GND
Y
C.PAUSE
REC ALARM
BATT. WARNING
SAVE/AUDIO
GND(AUDIO)
AUDIO (-)
AUDIO (+)
J1703 CAMERA JACK
CN30
12V
GND
To REG PG1830
REMOTE 1
REMOTE 2
REMOTE 5V
RECEIVE 2A
RECEIVE 2B
BATT. WARNING
To SYS. CON.-II (1J),(2J) (7J)-(10J)
S701 C.PAUSE
Q701 2SB709A
R702 220
R703 2.2K
R701 4.7K
Q705 DTC144K (26)
Q702 DTC144K (26)
12V
5V
GND
To REG. (1N)-(3N)
C.PAUSE
VTR SAVE
REC ALARM
SC5V
To SYS. CON.-I (1U)-(4U)
R712 27K
R713 22K
R704 100K
R708 100K
R714 100K
R711 39K
C701 2.2/50
R710 22K
C702 10/16
IC701 NJM2903M POWER SAVE DETECT.
J1704 REMOTE 2
PG747
GND
RECEIVE A
RECEIVE B
TRANSMIT B
TRANSMIT A
GND (AUDIO)
AUDIO MONO
AUDIO (-)
AUDIO (+)
To AUDIO-I (1L)-(4L)
RECEIVE A
RECEIVE B
TRANSMIT B
TRANSMIT A
To SYS. CON.-II (3J)-(6J)
MAS (JACK) P.C.B
E
D
C
B
A

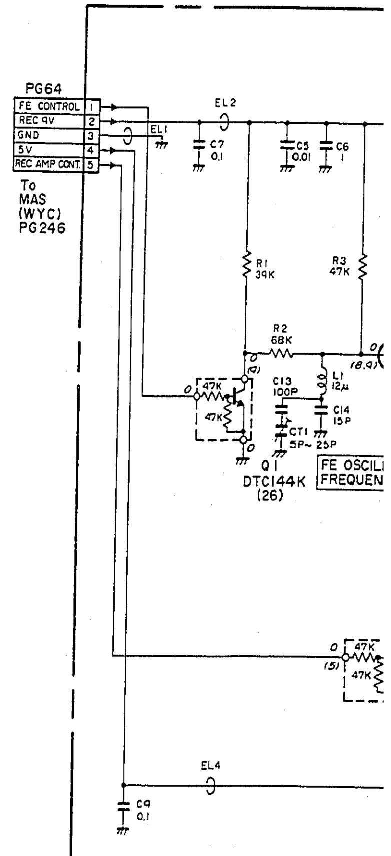
※ 電圧値1コ表示：PB又はRECモード
※ ONE VOLTAGE : PB OR REC MODE

REG(MAS) SCHEMATIC DIAGRAM


PG849
12V
GND(S)
5.6V
BU12V
To PBK PG1849
BU12V
To SYS.CON.-I (2F)
Q853 2SB1001
Q855 2SB1001
R854 470
R857 470
C855 47/63
C856 0.1
C857 0.1
C858 47/63
R853 3.9K
R872 5.6K
C854 0.1
R855 330
Q854 FMW1 (W1)
R873 3.9K
C868 0.1
R856 4.7K
R859 330
Q856 FMW1 (W1)
5V
GND
To SERVO (1O),(2O)
5V
GND
9V
To AUDIO-I (1C)-(3C)
12V
5V
GND
To JACK (1N)-(3N)
TP853
IC803 LP2951CM
ERROR AMP
Ref
C872 0.1
C873 10/16
R879 47K
RT852 1K-B
REF 9V
R880 6.8K
C871 0.1
Q861 FMC1 (C1)
P.CONT.
GND(M)
5.6V
12V
9V
GND
5V
To SYS.CON.-II (1X)-(7X)
L853 100μ
Q862 FMC2(C2)
D853 DAN202K(N)
PF
12V
To SYS.CON.-I (1F),(3F)
L851 22μ
R858 680
D852
R873 470
C860 0.1
C859 220/25
T851
L852 150μ/1.2A
C863 0.1
R863 1K
C862 220/25
ZD851 MA3082M
C874 1000P
R868 1.5K
PG816
12V
GND(M)
V CAP
FB V CAP
BU12V
To DMD PG1616
Q857 2SA1036
D852 CTB24H
ZD853 RD47E
R860 33K
Q859 2SK1093
R861 33K
Q858 2SC2411
IC802 HTS7164A
Ref
OSC
Vcc
GND
C866 220/4
R869 1.5K
QF851 ICP-N20
12V
9V
CIRCUIT PROTECT
R881 2.2K
PG868
SOURCE
DRAIN
GATE
PG768
Q865 2SJ165
R861 100
SC P.C.B (1/2)
R871 1K
C877 10/16
R883 10K
R882 3.9K
Q863 FMW1 (W1)
C878 2200P
C852 47/16
C853 0.1
QF852 ICP-N20
CIRCUIT PROTECT
TP851
TP852
To WYC (1Y),(2Y)
MAS (REG) P.C.B

※電圧値1コ表示：PB又はRECモード
※ONE VOLTAGE : PB OR REC MODE

IPP SCHEMATIC DIAGRA

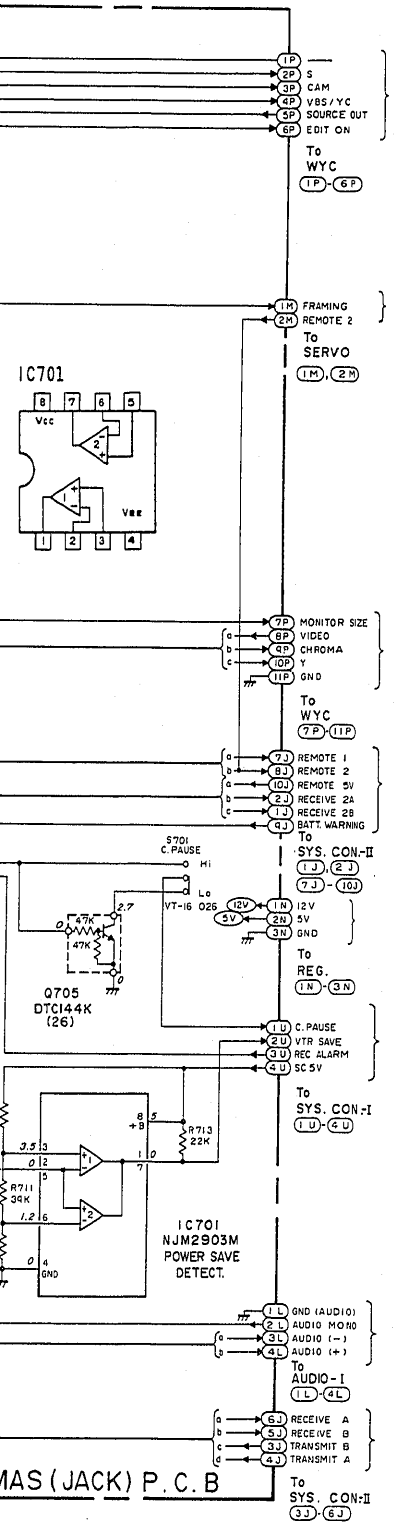

PG64
FE CONTROL
REC 9V
GND
5V
REC AMP CONT
To MAS (WYC) PG246
EL2
EL1
C7 0.1
C5 0.01
C6 1
R1 39K
R3 47K
R2 68K
C13 100P
L1 12μ
C14 15P
CT1 5P~25P
Q1 DTC144K (26)
FE OSCIL
FREQUEN
47K
EL4
C9 0.1

ノート:実際の回路番号は2000番台が追加になります
（但しIC,PGの端子番号は除きます）
NOTE:ADD 2000 TO ALL NUMBERS
(EXCEPT FOR IC's AND PG's PIN NUMBERS)

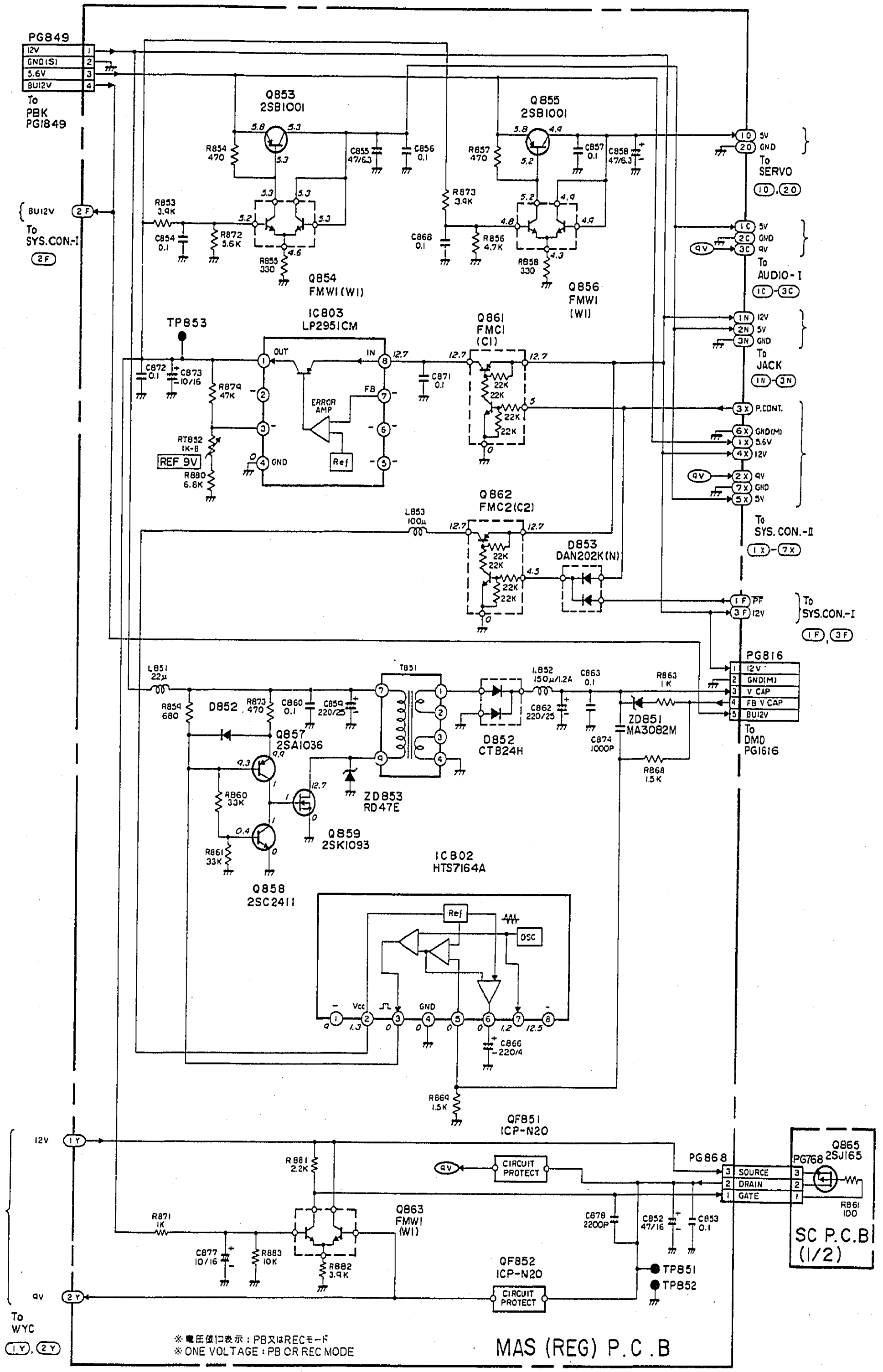
※ 電圧値1コ表示：PB又はRECモード
電圧値2コ表示：PBと(REC)モード
※ ONE VOLTAGE : PB OR REC MODE
TWO VOLTAGES : PB AND (REC) MODE

DIAGRAM CONFIGURATION	SCHEMA
AUDIO-I	5 –
AUDIO-II	5 –
COLOR ENCODER	5 – 4
DIG-1/3	5 – 5
DIG-2/3	5 – 5
DIG-3/3	5 – 5
DMD	5 – 1
FUNCTION SW	5 – 9
IPP	5 – 3
JACK	5 – 3
PB COLOR PROCESS	5 – 4
PB VIDEO	5 – 4
PBK	5 – 1
PREAMP	5 – 1
REG	5 – 2
REG(MAS)	5 – 3
REM	5 – 1
SC	5 – 26
SERVO	5 – 2
SPF	5 – 1
SYSTEM CONTROL – I	5 – 2
SYSTEM CONTROL – II	5 – 2
T/S	5 – 2
VID-1/2	5 – 3
VID-1/2	5 – 4
WYC	5 – 2

1 2 3 4 5 6 7 8 9

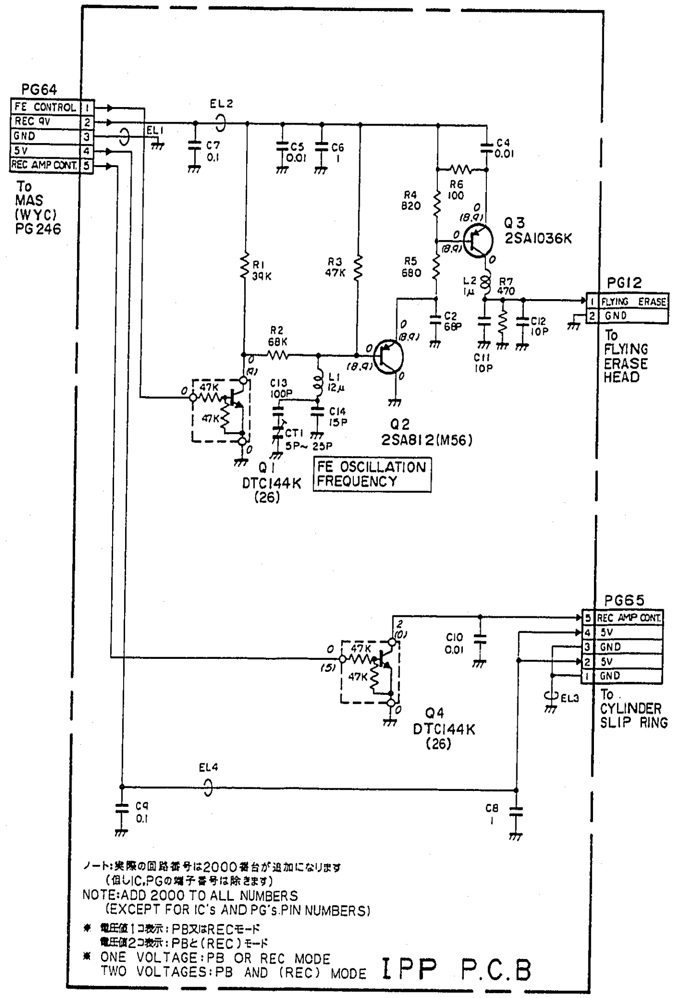

IC701
IC701
NJM2903M
POWER SAVE
DETECT.
Q705
DTC144K
(26)
S701
C.PAUSE
To
WYC
(1P)-(6P)
S
CAM
VBS/YC
SOURCE OUT
EDIT ON
FRAMING
REMOTE 2
To
SERVO
(1M),(2M)
MONITOR SIZE
VIDEO
CHROMA
Y
GND
To
WYC
(7P)-(11P)
REMOTE 1
REMOTE 2
REMOTE 5V
RECEIVE 2A
RECEIVE 2B
BATT. WARNING
To
SYS. CON.-II
12V
5V
GND
To
REG.
(1N)-(3N)
C.PAUSE
VTR SAVE
REC ALARM
SC 5V
To
SYS. CON.-I
(1U)-(4U)
GND (AUDIO)
AUDIO MONO
AUDIO (−)
AUDIO (+)
To
AUDIO-I
(1L)-(4L)
RECEIVE A
RECEIVE B
TRANSMIT B
TRANSMIT A
To
SYS. CON.-II
(3J)-(6J)
MAS (JACK) P.C.B

REG(MAS) SCHEMATIC DIAGRAM


PG849
12V
GND(S)
5.6V
8U12V
To
PBK
PG1849
Q853
2SB1001
Q855
2SB1001
Q854
FMW1(W1)
Q856
FMW1
(W1)
TP853
IC803
LP2951CM
ERROR
AMP
Ref
REF 9V
Q861
FMC1
(C1)
Q862
FMC2(C2)
D853
DAN202K(N)
To
SERVO
(1O),(2O)
To
AUDIO-I
(1C)-(3C)
To
JACK
(1I)-(3N)
P.CONT.
To
SYS. CON.-II
(1X)-(7X)
To
SYS.CON.-I
(1F),(3F)
To
SYS.CON.-I
(2F)
PG816
12V
GND(M)
V CAP
FB V CAP
8U12V
To
DMD
PG1616
T851
D852
CTB24H
ZD851
MA3082M
Q857
2SA1036
Q858
2SC2411
Q859
2SK1093
ZD853
RD47E
IC802
HTS7164A
OSC
QF851
ICP-N20
CIRCUIT
PROTECT
QF852
ICP-N20
Q863
FMW1
(W1)
PG868
SOURCE
DRAIN
GATE
TP851
TP852
PG768
Q865
2SJ165
SC P.C.B
(1/2)
To
WYC
(1Y),(2Y)
MAS (REG) P.C.B

※電圧値1コ表示：PB又はRECモード
※ONE VOLTAGE：PB OR REC MODE

IPP SCHEMATIC DIAGRAM

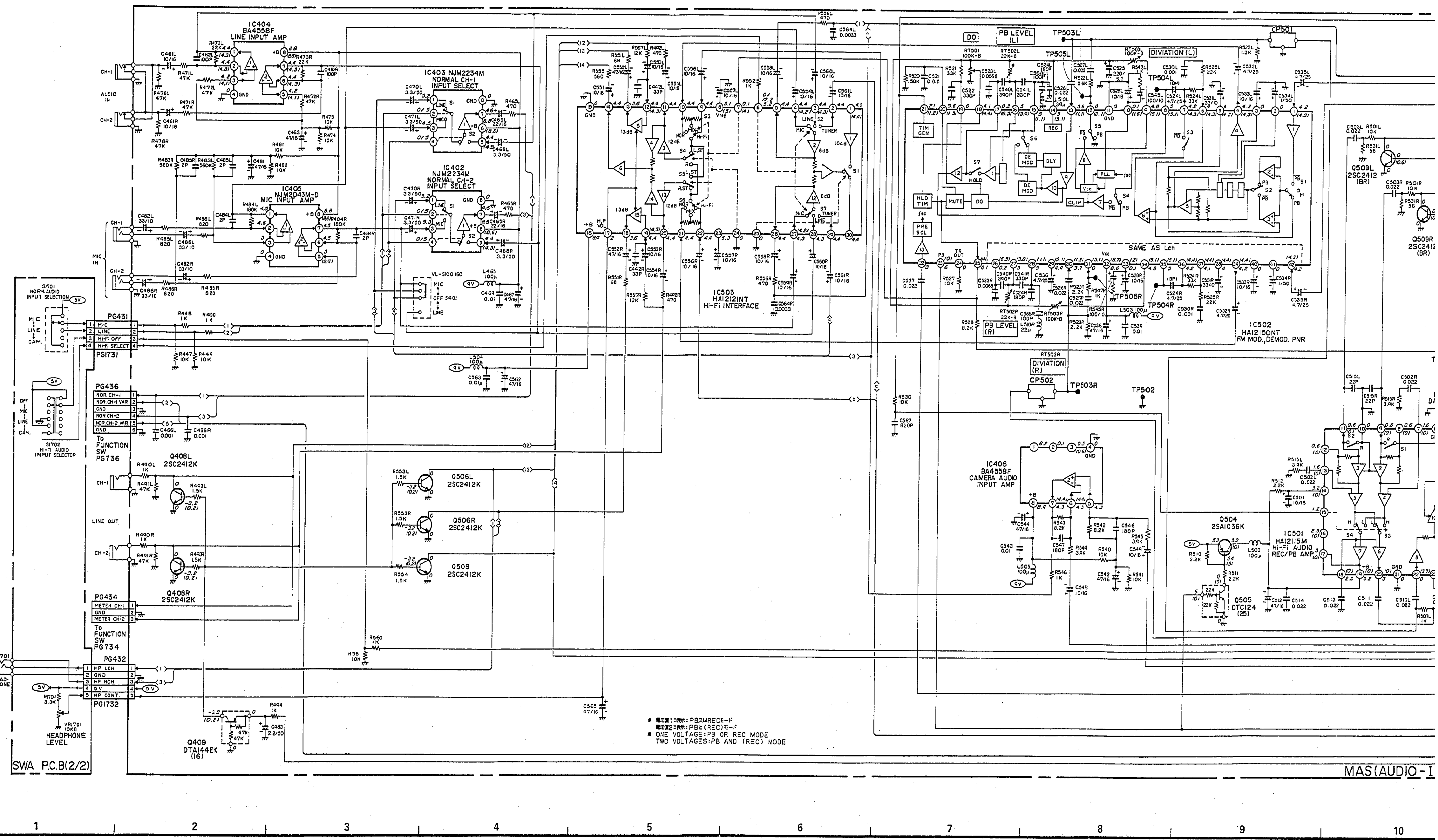

PG64
FE CONTROL
REC 9V
GND
5V
REC AMP CONT.
To
MAS
(WYC)
PG246
EL1
EL2
Q3
2SA1036K
Q2
2SA812(M56)
Q1
DTC144K
(26)
FE OSCILLATION
FREQUENCY
PG12
FLYING ERASE
GND
To
FLYING
ERASE
HEAD
PG65
REC AMP CONT.
5V
GND
5V
GND
To
CYLINDER
SLIP RING
Q4
DTC144K
(26)
EL3
EL4
IPP P.C.B

ノート：実際の回路番号は2000番台が追加になります
（但しIC,PGの端子番号は除きます）
NOTE:ADD 2000 TO ALL NUMBERS
(EXCEPT FOR IC's AND PG's.PIN NUMBERS)

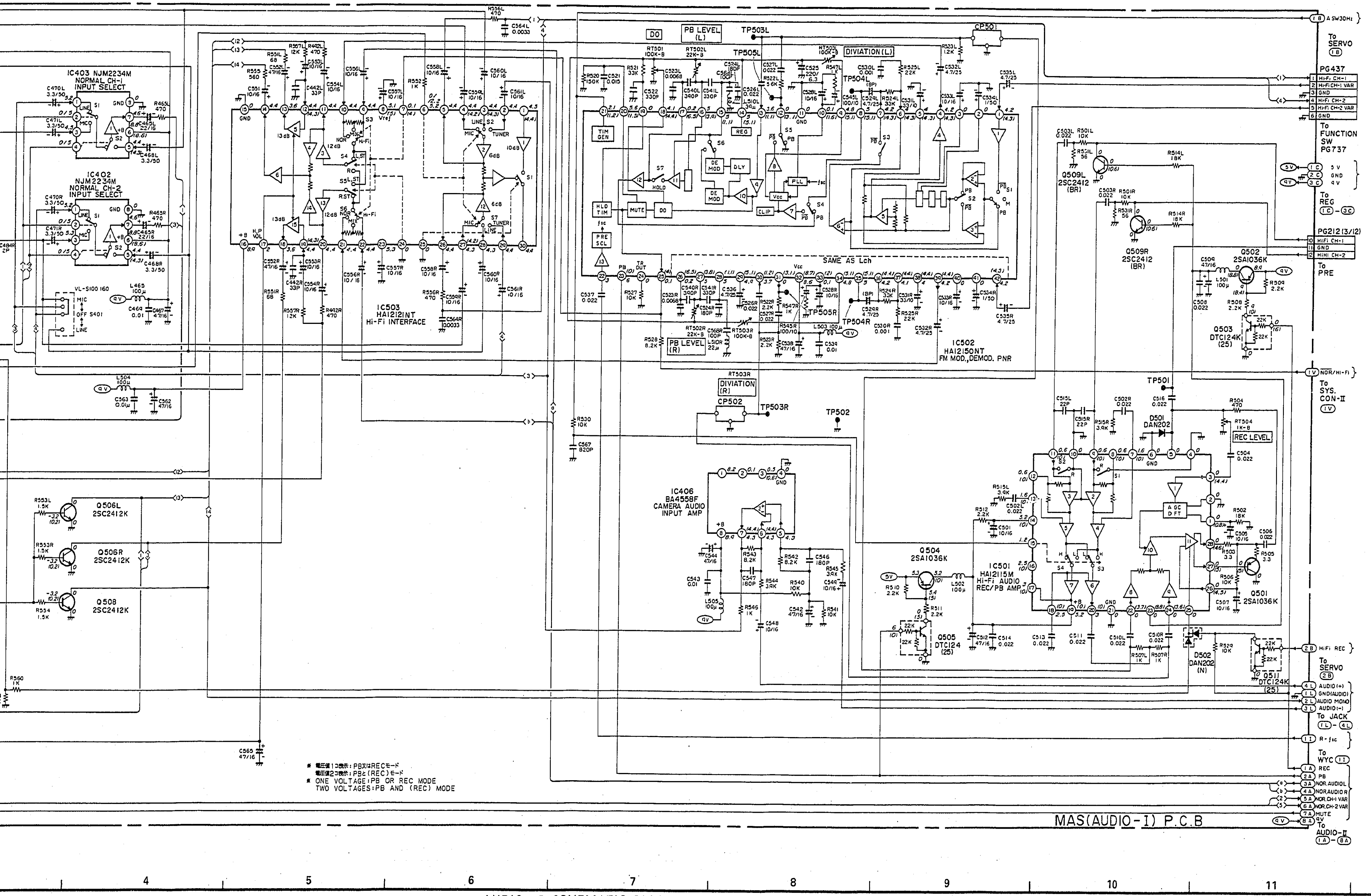
✱ 電圧値1コ表示：PB又はRECモード
電圧値2コ表示：PBと(REC)モード
✱ ONE VOLTAGE:PB OR REC MODE
TWO VOLTAGES:PB AND (REC) MODE

DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO-I	5-33 /	5-68
AUDIO-II	5-36 /	5-68
COLOR ENCODER	5-49 /	5-74
DIG-1/3	5-52 /	5-76
DIG-2/3	5-55 /	5-76
DIG-3/3	5-58 /	5-76
DMD	5-18 /	5-62
FUNCTION SW	5-9 /	5-64
IPP	5-32 /	5-71
JACK	5-30 /	5-68
PB COLOR PROCESS	5-44 /	5-74
PB VIDEO	5-46 /	5-74
PBK	5-12 /	5-64
PREAMP	5-13 /	–
REG	5-20 /	5-66
REG(MAS)	5-31 /	5-68
REM	5-16 /	5-67
SC	5-26/31/	5-71
SERVO	5-27 /	5-68
SPF	5-15 /	5-66
SYSTEM CONTROL-I	5-21 /	5-68
SYSTEM CONTROL-II	5-24 /	5-68
T/S	5-23 /	5-68
VID-1/2	5-39 /	5-72
VID-1/2	5-42 /	5-72
WYC	5-25 /	5-68

DIO– I SCHEMATIC DIAGRAM


IC404 BA4558F LINE INPUT AMP
IC403 NJM2234M NORMAL CH-1 INPUT SELECT
IC402 NJM2234M NORMAL CH-2 INPUT SELECT
IC405 NJM2043M-D MIC INPUT AMP
IC503 HA12121NT Hi-Fi INTERFACE
IC502 HA12150NT FM MOD.,DEMOD. PNR
IC406 BA4558F CAMERA AUDIO INPUT AMP
IC501 HA12115M Hi-Fi AUDIO REC/PB AMP
Q408L 2SC2412K
Q408R 2SC2412K
Q506L 2SC2412K
Q506R 2SC2412K
Q508 2SC2412K
Q409 DTA144EK (16)
Q504 2SA1036K
Q505 DTC124 (25)
Q509L 2SC2412 (BR)
Q509R 2SC2412 (BR)
S1701 NORM.AUDIO INPUT SELECTION
S1702 Hi-Fi AUDIO INPUT SELECTOR
VL-S100160
S401
PG431
PG1731
PG436
PG434
PG432
PG1732
To FUNCTION SW PG736
To FUNCTION SW PG734
CH-1
CH-2
AUDIO IN
MIC IN
LINE OUT
HEADPHONE LEVEL
VR1701 10KB
SWA P.C.B(2/2)
MAS(AUDIO-I
PB LEVEL (L)
PB LEVEL (R)
DIVIATION (L)
DIVIATION (R)
TP503L
TP505L
TP504L
TP505R
TP504R
TP503R
TP502
CP501
CP502
SAME AS Lch
1
2
3
4
5
6
7
8
9
10

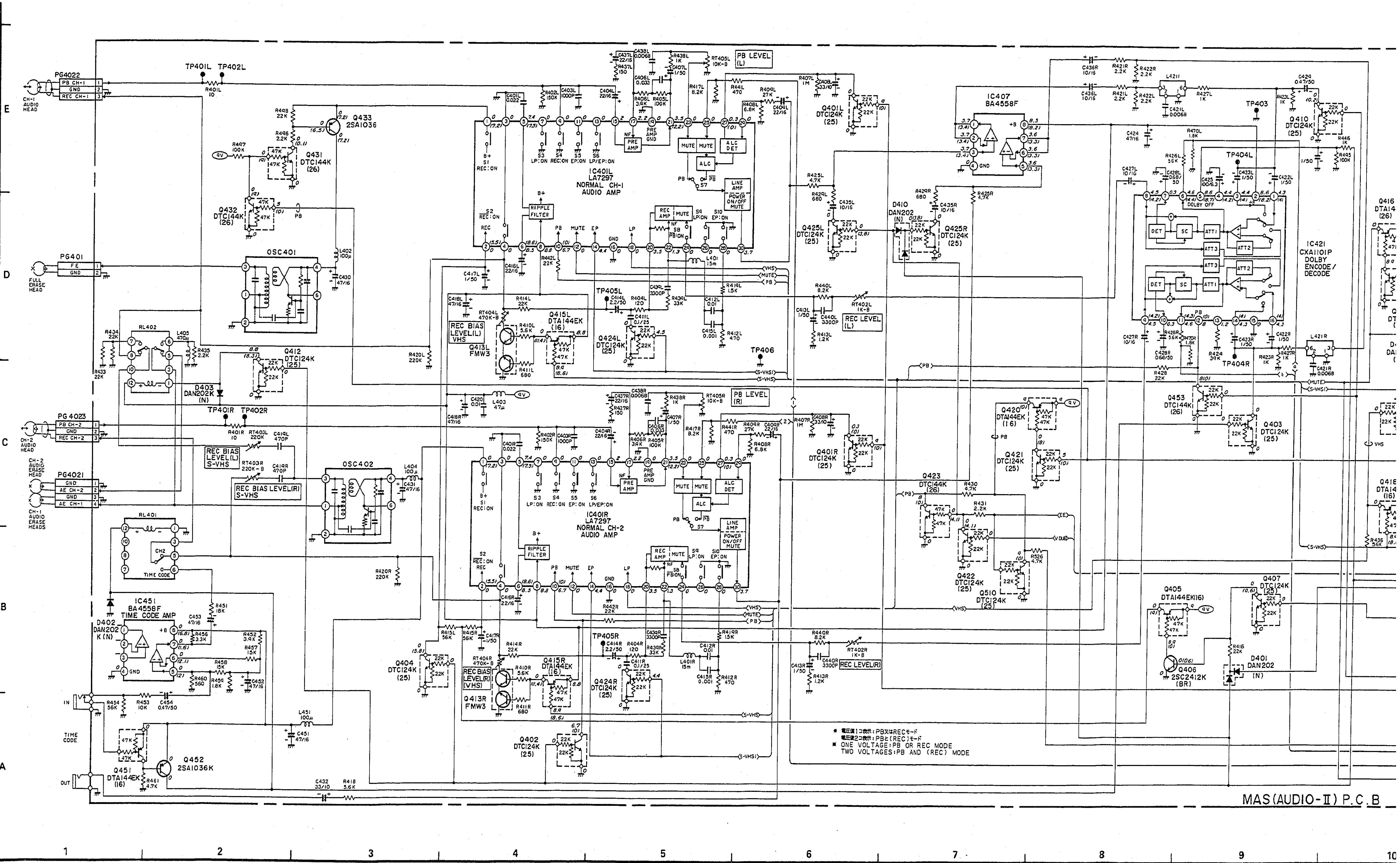
* 電圧値1つ表示：PBまたはRECモード
電圧値2つ表示：PBと(REC)モード
* ONE VOLTAGE: PB OR REC MODE
TWO VOLTAGES: PB AND (REC) MODE


IC403 NJM2234M
NORMAL CH-1
INPUT SELECT
IC402
NJM2234M
NORMAL CH-2
INPUT SELECT
VL-S100 160
MIC
OFF S401
LINE
IC503
HA12121NT
Hi-Fi INTERFACE
IC502
HA12150NT
FM MOD., DEMOD. PNR
IC406
BA4558F
CAMERA AUDIO
INPUT AMP
IC501
HA12115M
Hi-Fi AUDIO
REC/PB AMP
Q506L 2SC2412K
Q506R 2SC2412K
Q508 2SC2412K
Q509L 2SC2412 (BR)
Q509R 2SC2412 (BR)
Q502 2SA1036K
Q503 DTC124K (25)
Q504 2SA1036K
Q505 DTC124 (25)
Q501 2SA1036K
Q511 DTC124K (25)
D501 DAN202
D502 DAN202 (N)
DO
PB LEVEL (L)
PB LEVEL (R)
TP503L
TP505L
TP504L
TP505R
TP504R
TP503R
TP502
TP501
CP501
CP502
DIVIATION (L)
DIVIATION (R)
REC LEVEL
SAME AS Lch
TIM GEN
HLD TIM
PRE SCL
MUTE
DE MOD
DLY
REG
PLL
Vcc
CLIP
AGC DET
1 B A SW30Hz
To SERVO 1B
PG437
1 Hi-Fi CH-1
2 Hi-Fi CH-1 VAR
3 GND
4 Hi-Fi CH-2
5 Hi-Fi CH-2 VAR
6 GND
To FUNCTION SW PG737
1C 5V
2C GND
3C 9V
To REG 1C-3C
PG212(3/12)
10 HiFi CH-1
11 GND
12 HiFi CH-2
To PRE
1V NOR/Hi-Fi
To SYS. CON-II 1V
2B HiFi REC
To SERVO 2B
4L AUDIO(+)
1L GND(AUDIO)
2L AUDIO MONO
3L AUDIO(-)
To JACK 1L-4L
1I R-fsc
To WYC 1I
1A REC
2A PB
3A NOR.AUDIO L
4A NOR.AUDIO R
5A NOR.CH-1 VAR
6A NOR.CH-2 VAR
7A MUTE
8A 9V
To AUDIO-II 1A-8A
MAS(AUDIO-I) P.C.B
4
5
6
7
8
9
10
11

＊ 電圧値1つ表示：PB又はRECモード
電圧値2つ表示：PBと(REC)モード
＊ ONE VOLTAGE:PB OR REC MODE
TWO VOLTAGES:PB AND (REC) MODE

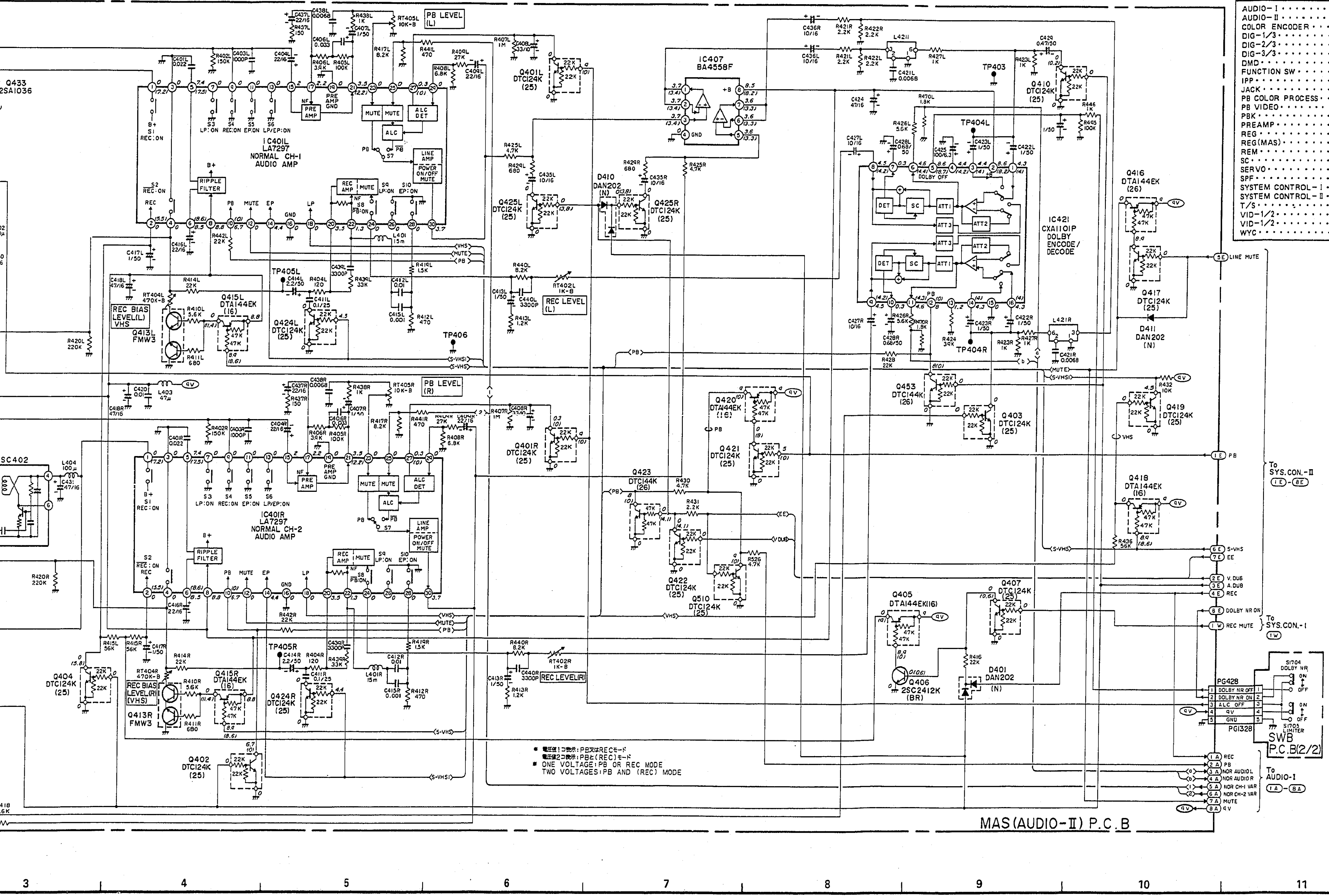
AUDIO-I SCHEMATIC DIAGRAM 5-34　　5-35 AUDIO-I SCHEMATIC DIAGRAM

AUDIO－Ⅱ SCHEMATIC DIAGRAM


E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
CH-1 AUDIO HEAD
PG4022
PB CH-1
GND
REC CH-1
TP401L
TP402L
R401L 10
Q433 2SA1036
Q431 DTC144K (26)
Q432 DTC144K (26)
R497 100K
R498 22K
R496 2.2K
PB
PG401
FE
GND
FULL ERASE HEAD
OSC401
L402 100μ
C430 47/16
RL402
L405 470μ
R434 22K
R433 22K
R435 2.2K
Q412 DTC124K (25)
D403 DAN202K (N)
TP401R
TP402R
PG4023
PB CH-2
GND
REC CH-2
CH-2 AUDIO HEAD
R401R 10
RT403L 220K
C419L 470P
REC BIAS LEVEL(L) S-VHS
RT403R 220K-B
C419R 470P
REC BIAS LEVEL(R) S-VHS
CH-2 AUDIO ERASE HEAD
PG4021
GND
AE CH-2
GND
AE CH-1
CH-1 AUDIO ERASE HEADS
OSC402
L404 100μ
C431 47/16
RL401
CH2
TIME CODE
IC451 BA4558F TIME CODE AMP
D402 DAN202 K(N)
R451 18K
C453 47/16
R456 3.3K
R452 3.9K
R457 15K
R458 15K
R460 560
R459 1.8K
C452 47/16
IN
R454 56K
R453 10K
C454 0.47/50
L451 100μ
C451 47/16
TIME CODE
Q452 2SA1036K
Q451 DTA144EK (16)
R461 4.7K
OUT
C432 33/10
R418 5.6K
R420L 220K
R420R 220K
IC401L LA7297 NORMAL CH-1 AUDIO AMP
IC401R LA7297 NORMAL CH-2 AUDIO AMP
B+
S1 REC:ON
S2 REC:ON
S3 LP:ON
S4 REC:ON
S5 EP:ON
S6 LP/EP:ON
S7
S8 PB:ON
S9 LP:ON
S10 EP:ON
PRE AMP
PRE AMP GND
MUTE
ALC
ALC DET
LINE AMP
POWER ON/OFF MUTE
REC AMP
RIPPLE FILTER
NF
REC
PB
EP
GND
LP
C401L 0.022
R402L 150K
C403L 1000P
C404L 22/16
C437L 22/16
C438L 0.0068
R437L 150
R438L 1K
C406L 0.033
C407L 1/50
R406L 3.9K
R405L 100K
RT405L 10K-B
PB LEVEL (L)
R417L 8.2K
R441L 470
R409L 27K
R408L 6.8K
C409L 22/16
R407L 1M
C408L 33/10
Q401L DTC124K (25)
C417L 1/50
C416L 22/16
R442L 22K
C418L 47/16
RT404L 470K-B
REC BIAS LEVEL(L) VHS
R414L 22K
R410L 5.6K
R411L 680
Q413L FMW3
Q415L DTA144EK (16)
TP405L
C414L 2.2/50
R404L 120
C411L 0.1/25
C434L 3300P
R439L 33K
Q424L DTC124K (25)
L401 15m
C412L 0.01
R419L 1.5K
C415L 0.001
R412L 470
TP406
R440L 8.2K
RT402L 1K-B
REC LEVEL (L)
C413L 1/50
C440L 3300P
R413L 1.2K
C420 0.01
L403 47μ
C418R 47/16
C401R 0.022
R402R 150K
C403R 1000P
C404R 22/16
C437R 22/16
C438R 0.0068
R437R 150
R438R 1K
C407R 1/50
R406R 3.9K
R405R 100K
RT405R 10K-B
PB LEVEL (R)
R417R 8.2K
R441R 470
R409R 27K
C409R 22/16
R408R 6.8K
R407R 1M
C408R 33/10
Q401R DTC124K (25)
C416R 22/16
R442R 22K
R415L 56K
R415R 56K
C417R 1/50
Q404 DTC124K (25)
RT404R 470K-B
REC BIAS LEVEL(R) (VHS)
R414R 22K
R410R 5.6K
R411R 680
Q413R FMW3
Q415R DTA144EK (16)
TP405R
C414R 2.2/50
R404R 120
C411R 0.1/25
C439R 3300P
R439R 33K
Q424R DTC124K (25)
L401R 15m
C412R 0.01
R419R 1.5K
C415R 0.001
R412R 470
R440R 8.2K
RT402R 1K-B
REC LEVEL(R)
C413R 1/50
C440R 3300P
R413R 1.2K
Q402 DTC124K (25)
VHS
MUTE
S-VHS
S-VHS1
R425L 4.7K
R429L 680
C435L 10/16
Q425L DTC124K (25)
R429R 680
C435R 10/16
R425R 4.7K
D410 DAN202 (N)
Q425R DTC124K (25)
IC407 BA4558F
+B
GND
C436R 10/16
C436L 10/16
R421R 2.2K
R421L 2.2K
R422R 2.2K
R422L 2.2K
L421I
C421L 0.0068
R427L 1K
TP403
C429 0.47/50
R423L 1K
Q410 DTC124K (25)
R446 1K
R445 100K
C424 47/16
R470L 1.8K
R426L 56K
C428L 0.068/50
C425 100/6.3
TP404L
C423L 1/50
C422L 1/50
C427L 10/16
DOLBY OFF
DET
SC
ATT1
ATT2
ATT3
IC421 CXA1101P DOLBY ENCODE/DECODE
C427R 10/16
C428R 0.68/50
R426R 3.6K
R470R 1.8K
R424 39K
C423R 1/50
C422R 1/50
TP404R
R423R 1K
R427R 1K
L421R
C421R 0.0068
R428 22K
Q453 DTC144K (26)
Q403 DTC124K (25)
Q420 DTA144EK (16)
Q421 DTC124K (25)
Q423 DTC144K (26)
R430 4.7K
R431 2.2K
EE
V DUB
Q422 DTC124K (25)
R526 4.7K
Q510 DTC124K (25)
Q405 DTA144EK (16)
Q406 2SC2412K (BR)
R416 22K
D401 DAN202 (N)
Q407 DTC124K (25)
Q416
Q418
R436 56K
MAS(AUDIO－Ⅱ) P.C.B

* 電圧値1コ表示：PB又はRECモード
  電圧値2コ表示：PBと(REC)モード
* ONE VOLTAGE：PB OR REC MODE
  TWO VOLTAGES：PB AND (REC) MODE

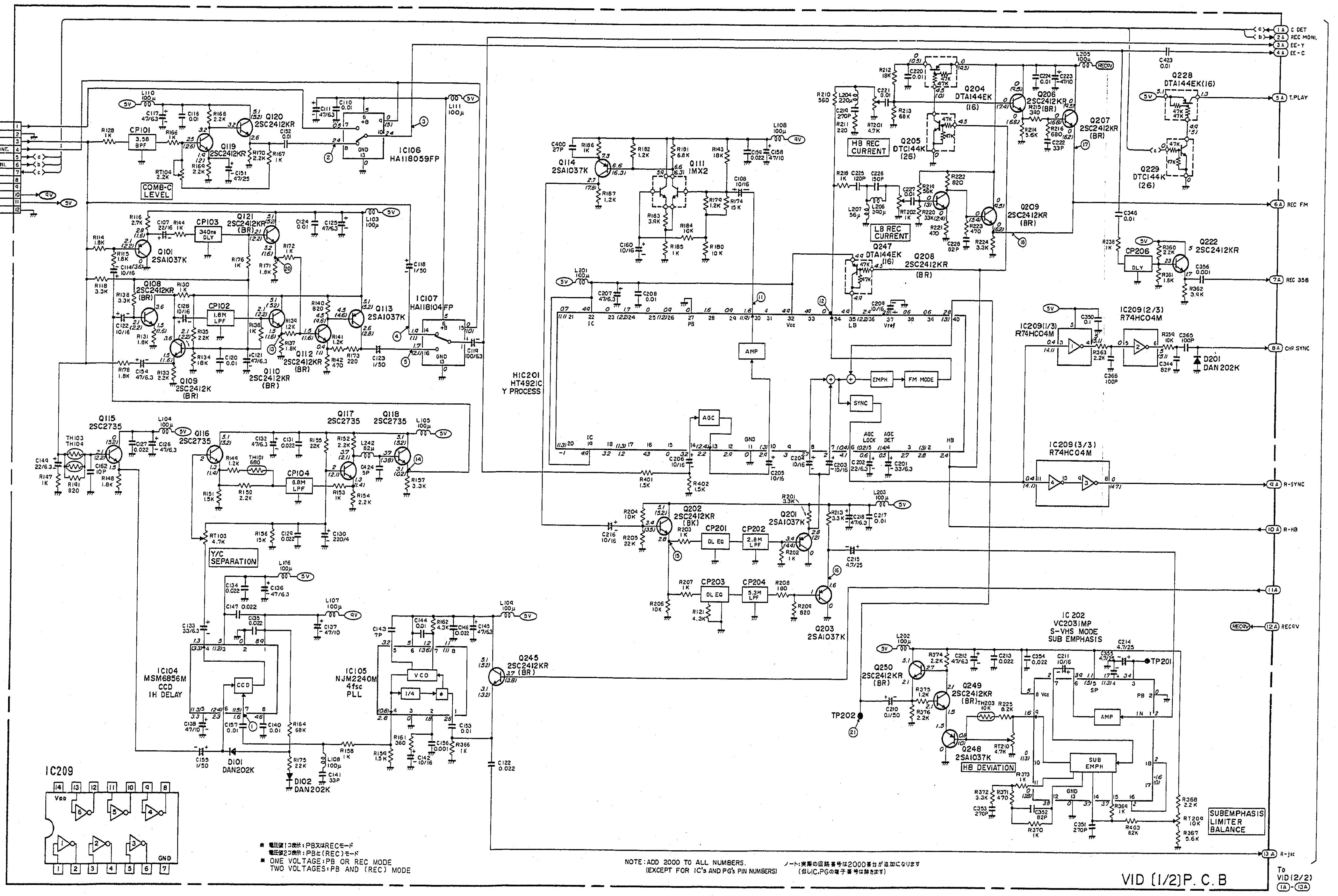
DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO-I	5-33	5-68
AUDIO-II	5-36	5-68
COLOR ENCODER	5-49	5-74
DIG-1/3	5-52	5-76
DIG-2/3	5-55	5-76
DIG-3/3	5-58	5-76
DMD	5-18	5-62
FUNCTION SW	5-9	5-64
IPP	5-32	5-71
JACK	5-30	5-68
PB COLOR PROCESS	5-44	5-74
PB VIDEO	5-46	5-74
PBK	5-12	5-64
PREAMP	5-13	-
REG	5-20	5-66
REG(MAS)	5-31	5-68
REM	5-16	5-67
SC	5-26/31	5-71
SERVO	5-27	5-68
SPF	5-15	5-66
SYSTEM CONTROL-I	5-21	5-68
SYSTEM CONTROL-II	5-24	5-68
T/S	5-23	5-68
VID-1/2	5-39	5-72
VID-1/2	5-42	5-72
WYC	5-25	5-68


Q433
2SA1036
IC401L
LA7297
NORMAL CH-1
AUDIO AMP
IC401R
LA7297
NORMAL CH-2
AUDIO AMP
PRE AMP
PRE AMP GND
MUTE
ALC
ALC DET
LINE AMP
POWER ON/OFF MUTE
REC AMP
RIPPLE FILTER
S1 REC:ON
S2 REC:ON
S3 LP:ON
S4 REC:ON
S5 EP:ON
S6 LP/EP:ON
S7
S8 PB:ON
S9 LP:ON
S10 EP:ON
PB LEVEL (L)
PB LEVEL (R)
RT405L 10K-B
RT405R 10K-B
REC LEVEL (L)
REC LEVEL(R)
RT402L 1K-B
RT402R 1K-B
REC BIAS LEVEL(L) VHS
REC BIAS LEVEL(R) (VHS)
RT404L 470K-B
RT404R 470K-B
Q413L FMW3
Q413R FMW3
Q415L DTA144EK (16)
Q415R DTA144EK (16)
Q424L DTC124K (25)
Q424R DTC124K (25)
Q425L DTC124K (25)
Q425R DTC124K (25)
Q401L DTC124K (25)
Q401R DTC124K (25)
Q402 DTC124K (25)
Q404 DTC124K (25)
TP405L
TP405R
TP406
L401 15m
L403 47μ
L404 100μ
SC402
IC407
BA4558F
D410 DAN202 (N)
IC421
CXA1101P
DOLBY
ENCODE/
DECODE
DET
SC
ATT1
ATT2
ATT3
DOLBY OFF
TP403
TP404L
TP404R
L421I
L421R
Q410 DTC124K (25)
Q416 DTA144EK (26)
Q417 DTC124K (25)
D411 DAN202 (N)
Q419 DTC124K (25)
Q418 DTA144EK (16)
Q453 DTC144K (26)
Q403 DTC124K (25)
Q420 DTA144EK (16)
Q421 DTC124K (25)
Q423 DTC144K (26)
Q422 DTC124K (25)
Q510 DTC124K (25)
Q405 DTA144EK(16)
Q406 2SC2412K (BR)
Q407 DTC124K (25)
D401 DAN202 (N)
5E LINE MUTE
1E PB
6E S-VHS
7E EE
2E V.DUB
3E A.DUB
4E REC
8E DOLBY NR ON
1W REC MUTE
To SYS.CON.-II (1E)-(8E)
To SYS.CON.-I (1W)
PG428
DOLBY NR OFF
DOLBY NR ON
ALC OFF
9V
GND
PG1328
S1704 DOLBY NR
ON
OFF
S1705 LIMITER
SWB P.C.B(2/2)
1A REC
2A PB
3A NOR AUDIO L
4A NOR AUDIO R
5A NOR CH-1 VAR
6A NOR CH-2 VAR
7A MUTE
8A 9V
To AUDIO-I (1A)-(8A)
MAS(AUDIO-II) P.C.B
3
4
5
6
7
8
9
10
11

- 電圧値1つ表示：PB又はRECモード
  電圧値2つ表示：PBと(REC)モード
- ONE VOLTAGE: PB OR REC MODE
  TWO VOLTAGES: PB AND (REC) MODE

-1/2 SCHEMATIC DIAGRAM

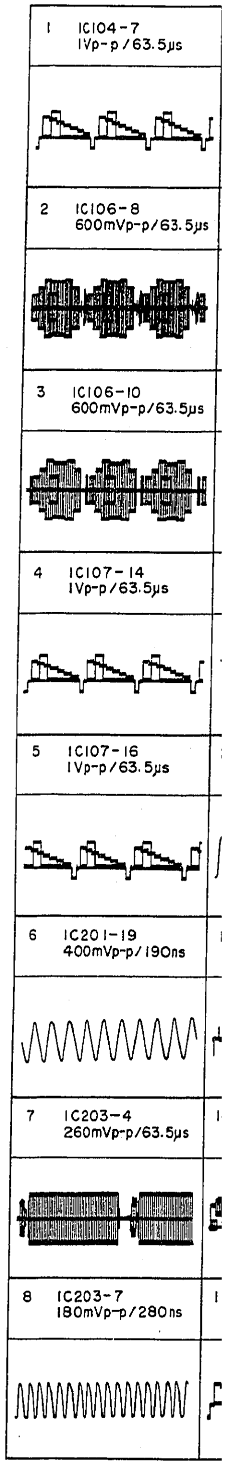
VID WAVEFC


PG251
C
GND(S)
Y/VBS
Y/C CONT.
T.PLAY
REC MONI.
C. DET
9V
5V
GND
To MAS (WYC) PG251
CP101 3.58 BPF
COMB-C LEVEL
Q119 2SC2412KR
Q120 2SC2412KR
IC106 HA118059FP
Q101 2SA1037K
CP103 340ns DLY
Q121 2SC2412KR (BR)
Q108 2SC2412KR (BR)
CP102 1.8M LPF
Q109 2SC2412K (BR)
Q110 2SC2412KR (BR)
Q112 2SC2412KR (BR)
Q113 2SA1037K
IC107 HA118104FP
Q115 2SC2735
Q116 2SC2735
Q117 2SC2735
Q118 2SC2735
CP104 6.8M LPF
Y/C SEPARATION
IC104 MSM6856M CCD 1H DELAY
CCD
D101 DAN202K
D102 DAN202K
IC105 NJM2240M 4fsc PLL
VCO
1/4
Q245 2SC2412KR (BR)
Q114 2SA1037K
Q111 IMX2
H IC201 HT4921C Y PROCESS
AMP
AGC
EMPH
FM MODE
SYNC
Q202 2SC2412KR (BK)
Q201 2SA1037K
CP201 DL EQ
CP202 2.8M LPF
CP203 DL EQ
CP204 5.3M LPF
Q203 2SA1037K
HB REC CURRENT
Q205 DTC144K (26)
Q204 DTA144EK (16)
Q206 2SC2412KR
Q207 2SC2412KR (BR)
LB REC CURRENT
Q209 2SC2412KR (BR)
Q247 DTA144EK (16)
Q208 2SC2412KR (BR)
Q228 DTA144EK(16)
Q229 DTC144K (26)
CP206 DLY
Q222 2SC2412KR
IC209(1/3) R74HC04M
IC209(2/3) R74HC04M
IC209(3/3) R74HC04M
D201 DAN202K
IC 202 VC2031MP S-VHS MODE SUB EMPHASIS
Q250 2SC2412KR (BR)
Q249 2SC2412KR (BR)
Q248 2SA1037K
HB DEVIATION
SUB EMPH
TP201
TP202
SUBEMPHASIS LIMITER BALANCE
C DET
REC MONI.
EE-Y
EE-C
T.PLAY
REC FM
REC 358
CHR SYNC
R-SYNC
R-HB
RECΘV
R-Jic
IC209
Vdd
GND
VID [1/2] P. C. B
To VID (2/2) (1A)-(13A)

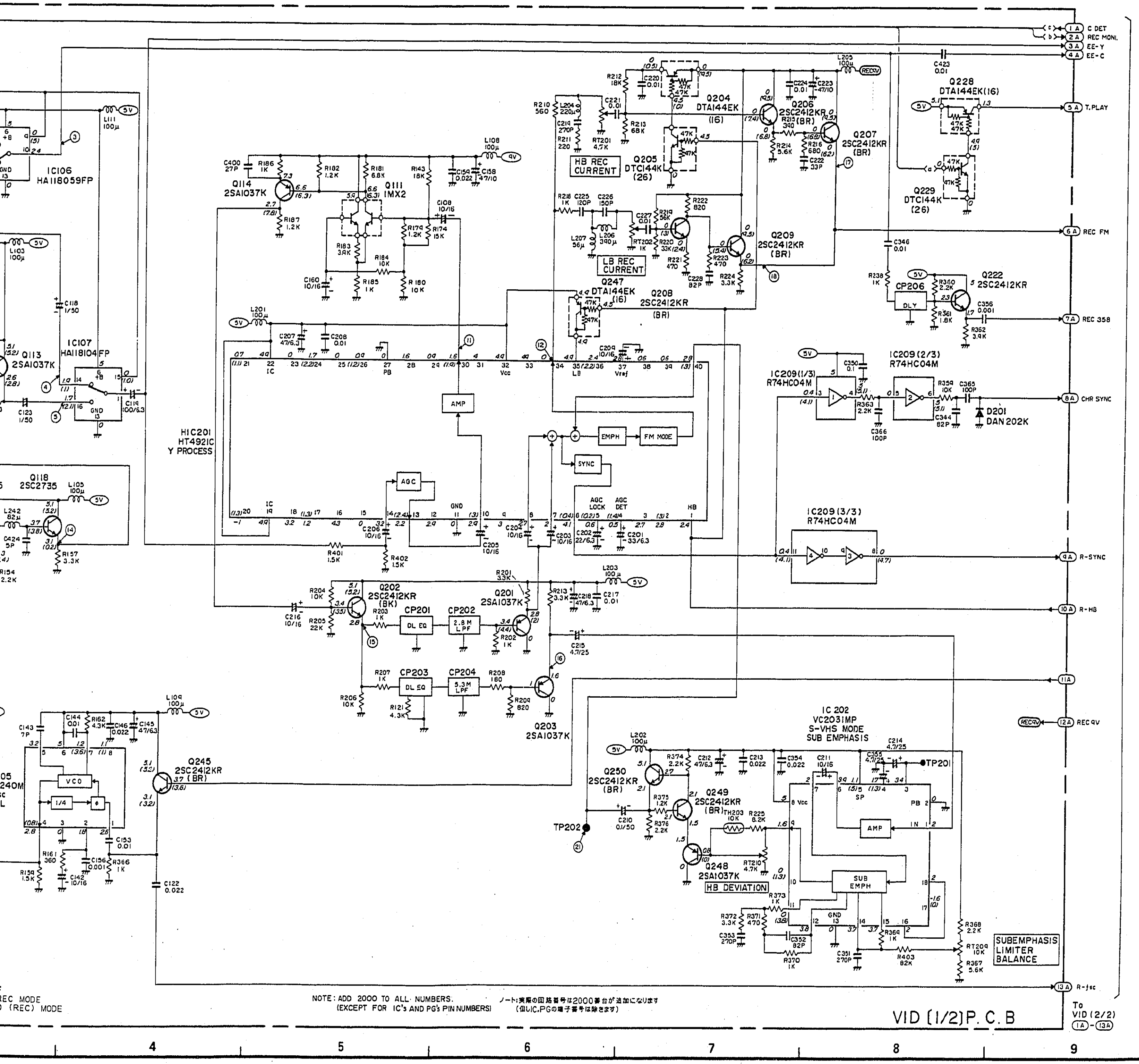
※ 電圧値1コ表示：PB又はRECモード
電圧値2コ表示：PBと(REC)モード
※ ONE VOLTAGE: PB OR REC MODE
TWO VOLTAGES: PB AND (REC) MODE

NOTE: ADD 2000 TO ALL NUMBERS.
(EXCEPT FOR IC's AND PG's PIN NUMBERS)

ノート：実際の回路番号は2000番台が追加になります
（但しIC,PGの端子番号は除きます）

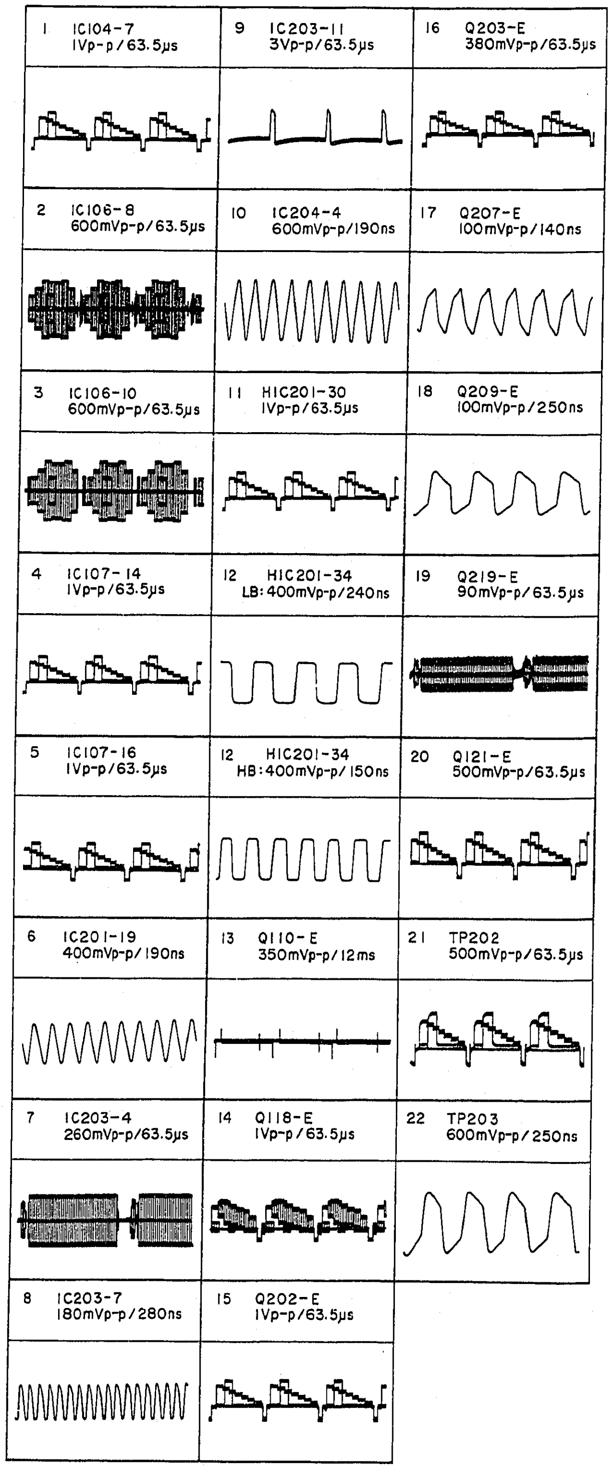


1 2 3 4 5 6 7 8 9 10

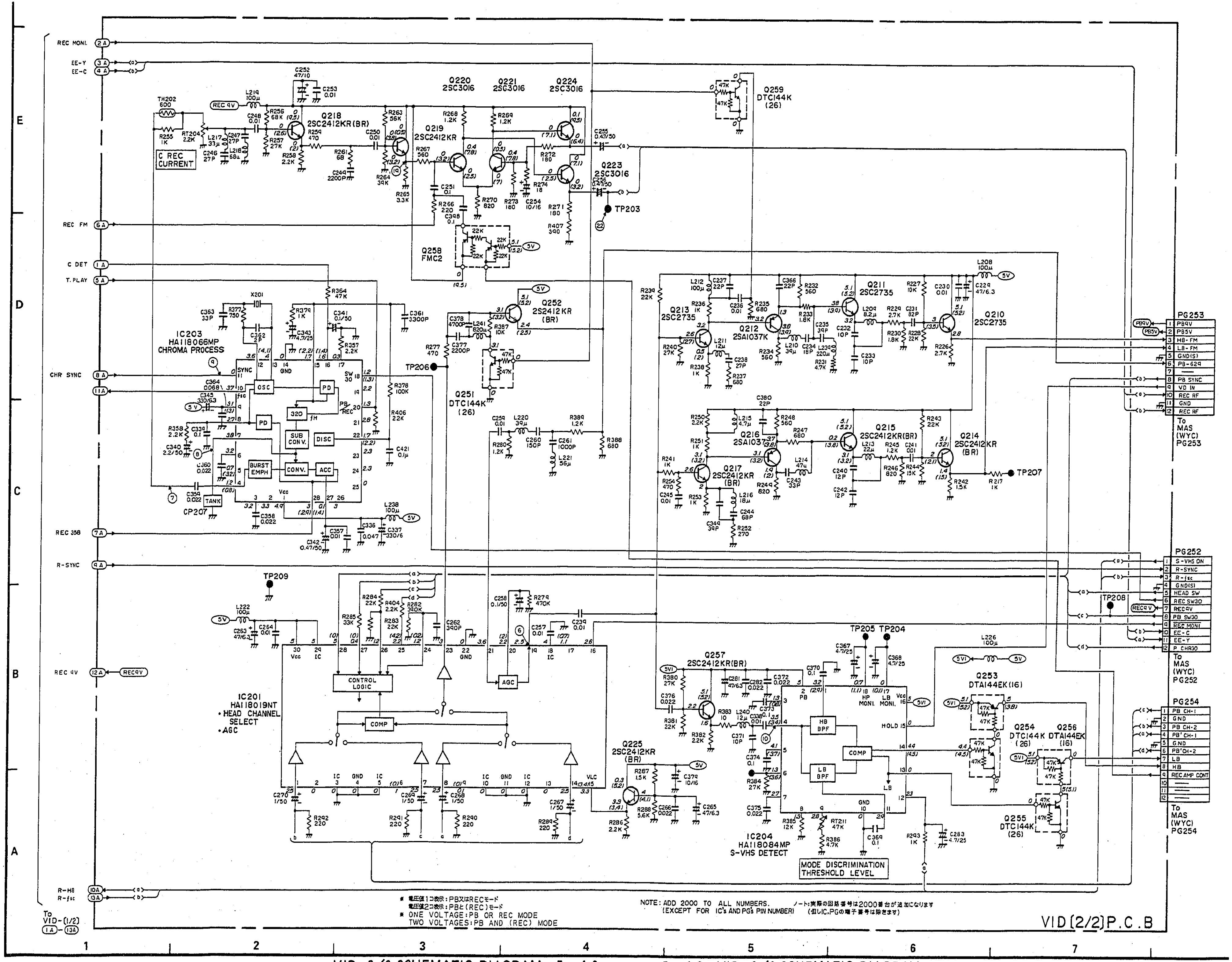


1C106
HA118059FP
1C107
HA118104FP
Q113
2SA1037K
Q114
2SA1037K
Q111
IMX2
Q118
2SC2735
H1C201
HT4921C
Y PROCESS
AGC
AMP
SYNC
EMPH
FM MODE
Q204
DTA144EK
Q205
DTC144K
Q206
2SC2412KR
Q207
2SC2412KR
Q208
2SC2412KR
Q209
2SC2412KR
Q247
DTA144EK
HB REC CURRENT
LB REC CURRENT
Q228
DTA144EK
Q229
DTC144K
Q222
2SC2412KR
CP206
DLY
1C209(1/3)
R74HC04M
1C209(2/3)
R74HC04M
1C209(3/3)
R74HC04M
D201
DAN202K
Q202
2SC2412KR
Q201
2SA1037K
Q203
2SA1037K
CP201
DL EQ
CP202
2.8M LPF
CP203
DL EQ
CP204
5.3M LPF
Q245
2SC2412KR
VCO
1/4
Q250
2SC2412KR
Q249
2SC2412KR
Q248
2SA1037K
HB DEVIATION
TP202
TP201
IC 202
VC2031MP
S-VHS MODE
SUB EMPHASIS
AMP
SUB EMPH
SUBEMPHASIS LIMITER BALANCE
C DET
REC MONI.
EE-Y
EE-C
T.PLAY
REC FM
REC 358
CHR SYNC
R-SYNC
R-HB
REC 9V
R-fsc
REC MODE
(REC) MODE
NOTE: ADD 2000 TO ALL NUMBERS. (EXCEPT FOR IC's AND PG's PIN NUMBERS)
ノート:実際の回路番号は2000番台が追加になります (但しIC,PGの端子番号は除きます)
VID (1/2) P. C. B
To VID (2/2) (1A)-(13A)
4
5
6
7
8
9
10
11

VID WAVEFORMS



VID－2／2 SCHEMATIC DIAGRAM

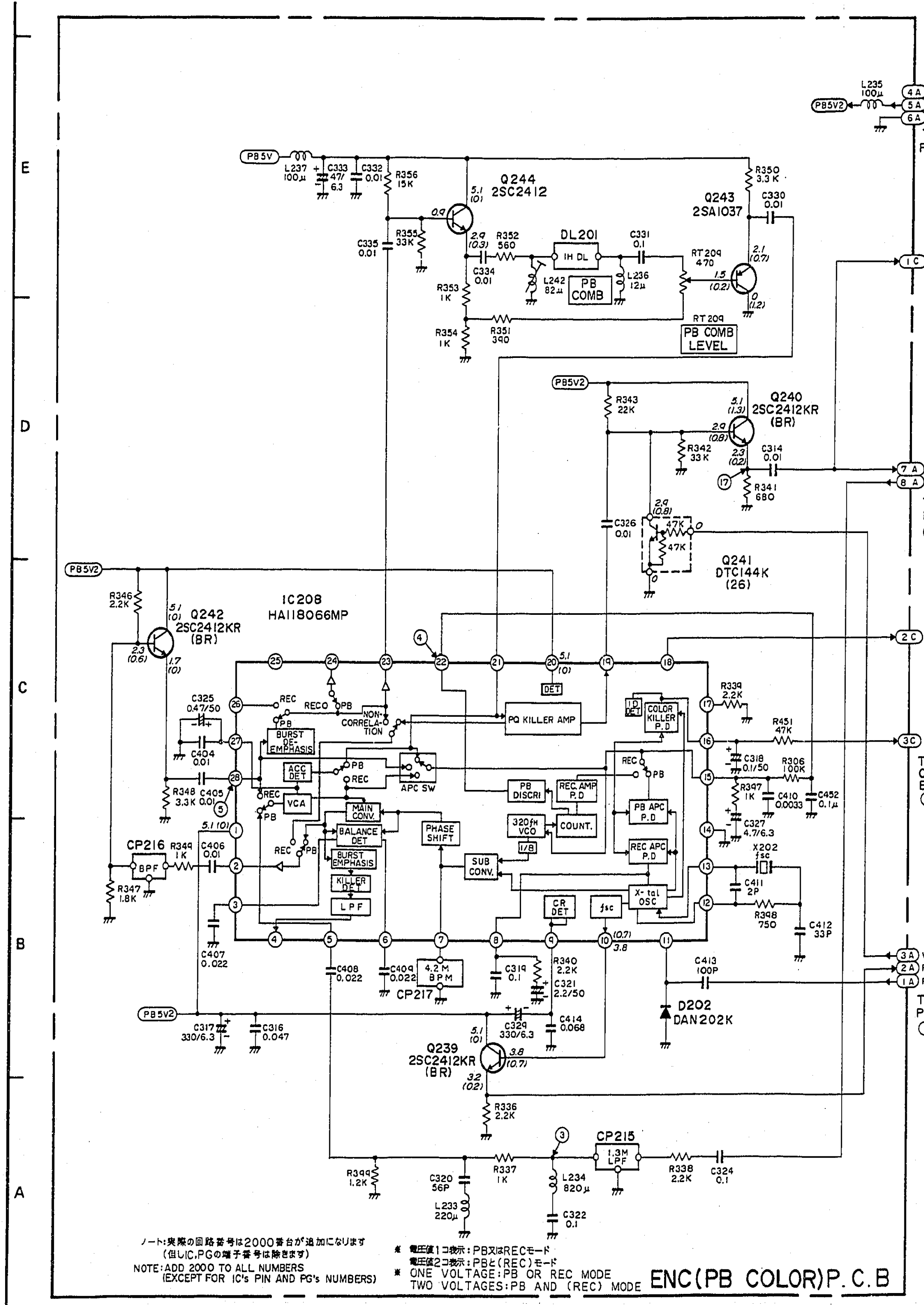

REC MONI.
EE-Y
EE-C
REC FM
C DET
T. PLAY
CHR SYNC
REC 358
R-SYNC
REC 9V
R-H8
R-fsc
To VID-(1/2) 1A~13A
TH202 600
R255 1K
RT204 2.2K
C REC CURRENT
L219 100μ
C252 47/10
C253 0.01
Q218 2SC2412KR(BR)
Q219 2SC2412KR
Q220 2SC3016
Q221 2SC3016
Q224 2SC3016
Q223 2SC3016
Q258 FMC2
TP203
Q259 DTC144K (26)
IC203 HA118066MP CHROMA PROCESS
SYNC
OSC
PD
320
SUB CONV.
DISC
BURST EMPH
CONV.
ACC
TANK
CP207
X201
Q252 2S2412KR (BR)
Q251 DTC144K (26)
TP206
Q211 2SC2735
Q213 2SC2735
Q212 2SA1037K
Q210 2SC2735
Q215 2SC2412KR(BR)
Q216 2SA1037K
Q217 2SC2412KR (BR)
Q214 2SC2412KR (BR)
TP207
PG253
1 PB9V
2 PB5V
3 HB-FM
4 LB-FM
5 GND(S)
6 PB-629
7 —
8 PB SYNC
9 VD IN
10 REC RF
11 GND
12 REC RF
To MAS (WYC) PG253
TP209
IC201 HA118019NT
• HEAD CHANNEL SELECT
• AGC
CONTROL LOGIC
COMP
AGC
TP205 TP204
Q257 2SC2412KR(BR)
Q225 2SC2412KR (BR)
IC204 HA118084MP S-VHS DETECT
HB BPF
LB BPF
COMP
HP MONI.
LB MONI.
HOLD
MODE DISCRIMINATION THRESHOLD LEVEL
RT211 47K
Q253 DTA144EK(16)
Q254 DTC144K (26)
Q256 DTA144EK (16)
Q255 DTC144K (26)
TP208
PG252
1 S-VHS ON
2 R-SYNC
3 R-fsc
4 GND(S)
5 HEAD SW
6 REC SW30
7 REC9V
8 PB SW30
9 REC MONI
10 EE-C
11 EE-Y
12 P CHR30
To MAS (WYC) PG252
PG254
1 PB CH-1
2 GND
3 PB CH-2
4 PB' CH-1
5 GND
6 PB' CH-2
7 LB
8 HB
9 RECAMP CONT
10 —
11 —
12 —
To MAS (WYC) PG254
VID (2/2) P.C.B
A B C D E
1 2 3 4 5 6 7

＊ 電圧値1コ表示：PB又はRECモード
電圧値2コ表示：PBと(REC)モード
＊ ONE VOLTAGE：PB OR REC MODE
TWO VOLTAGES：PB AND (REC) MODE

NOTE：ADD 2000 TO ALL NUMBERS.
(EXCEPT FOR IC's AND PG's PIN NUMBER)

ノート：実際の回路番号は2000番台が追加になります
(但しIC,PGの端子番号は除きます)

PB COLOR SCHEMATIC DIAGRAM


ENC(PB COLOR)P.C.B
IC208
HA118066MP
Q242
2SC2412KR
(BR)
Q244
2SC2412
Q243
2SA1037
Q240
2SC2412KR
(BR)
Q241
DTC144K
(26)
Q239
2SC2412KR
(BR)
DL201
1H DL
PB COMB
PB COMB LEVEL
RT209
CP216
BPF
CP215
1.3M LPF
CP217
4.2M BPM
D202
DAN202K
X202
fsc
PB5V
PB5V2
PG KILLER AMP
BURST DE-EMPHASIS
NON-CORRELATION
ACC DET
APC SW
VCA
MAIN CONV.
BALANCE DET
BURST EMPHASIS
KILLER DET
LPF
PHASE SHIFT
SUB CONV.
PB DISCRI
REC AMP P.D
320fH VCO
COUNT.
1/8
PB APC P.D
REC APC P.D
CR DET
fsc
X-tal OSC
COLOR KILLER P.D
DET
To PB V. PROCESS (4A)-(6A)
To COLOR ENC (1C)
To PB V. PROCESS (7A),(8A)
To COLOR ENC (2C),(3C)
To PB V. PROCESS (1A)-(3A)
PB-C
PB-629
P.CHR30
CEN LOCK
VD IN
PB SC
PB C.SYNC
GND
E
D
C
B
A
1
2
3
4

ノート:実際の回路番号は2000番台が追加になります
(但しIC,PGの端子番号は除きます)

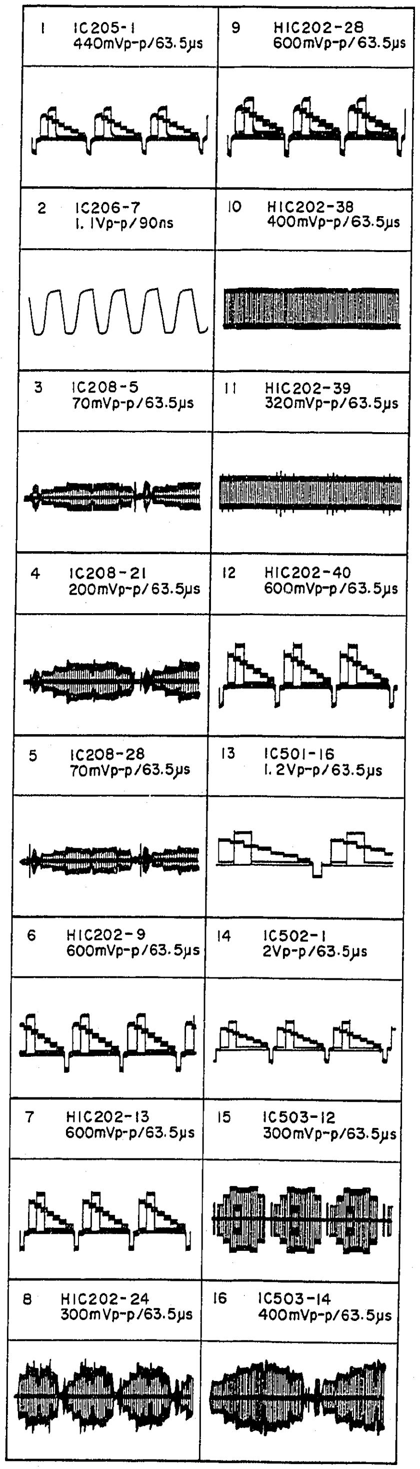
NOTE: ADD 2000 TO ALL NUMBERS
(EXCEPT FOR IC's PIN AND PG's NUMBERS)

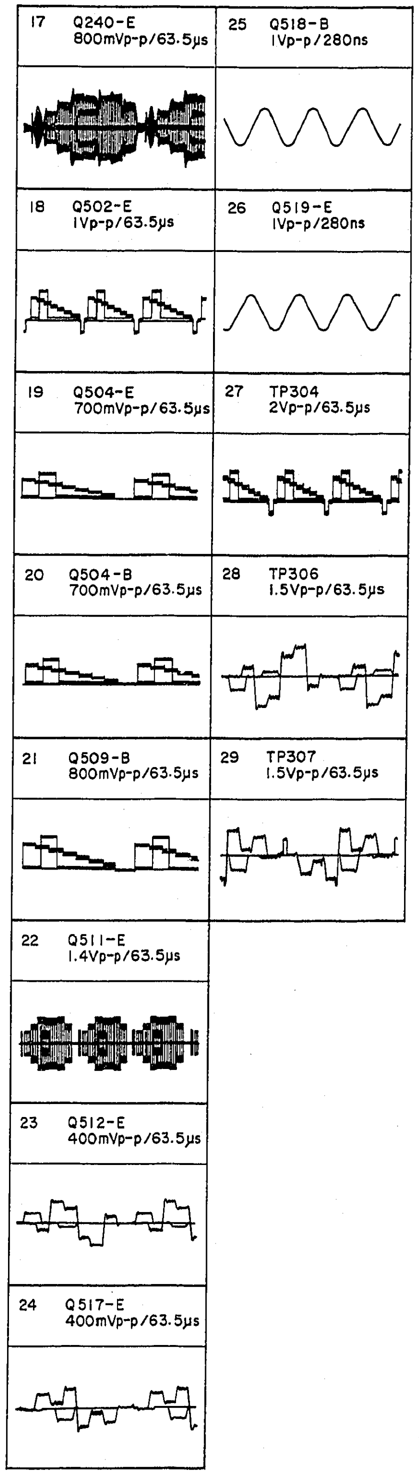
※ 電圧値1コ表示:PB又はRECモード
電圧値2コ表示:PBと(REC)モード

※ ONE VOLTAGE: PB OR REC MODE
TWO VOLTAGES: PB AND (REC) MODE

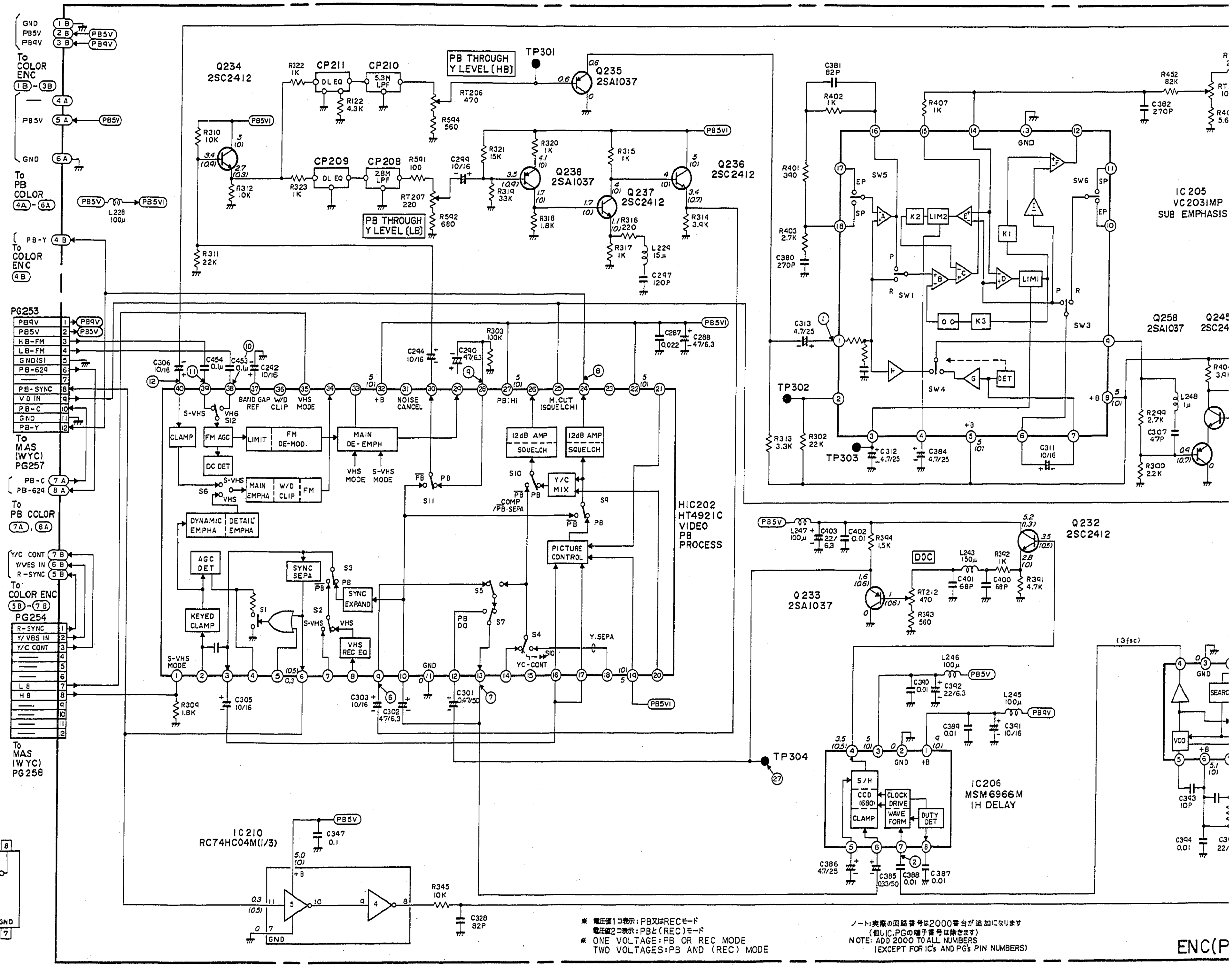
DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO-I	5-33	5-68
AUDIO-II	5-36	5-68
COLOR ENCODER	5-49	5-74
DIG-1/3	5-52	5-76
DIG-2/3	5-55	5-78
DIG-3/3	5-58	5-76
DMD	5-18	5-62
FUNCTION SW	5-9	5-64
IPP	5-32	5-71
JACK	5-30	5-68
PB COLOR PROCESS	5-44	5-74
PB VIDEO	5-46	5-74
PBK	5-12	5-64
PREAMP	5-13	-
REG	5-20	5-66
REG(MAS)	5-31	5-68
REM	5-16	5-67
SC	5-26/31	5-71
SERVO	5-27	5-68
SPF	5-15	5-66
SYSTEM CONTROL-I	5-21	5-68
SYSTEM CONTROL-II	5-24	5-68
T/S	5-23	5-68
VID-1/2	5-39	5-72
VID-1/2	5-42	5-72
WYC	5-25	5-68

ENC WAVEFORMS





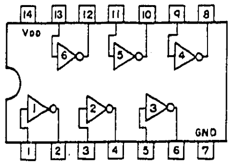
PB VIDEO PROCESS SCHEMATIC DIAGRAM


GND
PB5V
PB9V
1B
2B
3B
To COLOR ENC 1B-3B
4A
5A
6A
To PB COLOR ENC 4A-6A
L228 100μ
PB-Y 4B
To COLOR ENC 4B
PG253
PB9V
PB5V
HB-FM
LB-FM
GND(S)
PB-629
PB-SYNC
VD IN
PB-C
GND
PB-Y
To MAS (WYC) PG257
PB-C 7A
PB-629 8A
To PB COLOR 7A, 8A
Y/C CONT 7B
Y/VBS IN 6B
R-SYNC 5B
To COLOR ENC 5B-7B
PG254
R-SYNC
Y/VBS IN
Y/C CONT
L8
H8
To MAS (WYC) PG258
Q234 2SC2412
R322 1K
CP211 DL EQ
CP210 5.3M LPF
R122 4.3K
PB THROUGH Y LEVEL (HB)
TP301
Q235 2SA1037
RT206 470
R594 560
R310 10K
R312 10K
R323 1K
CP209 DL EQ
CP208 2.8M LPF
R591 100
RT207 220
PB THROUGH Y LEVEL (LB)
R592 680
C299 10/16
R321 15K
R320 1K
R319 33K
Q238 2SA1037
R318 1.8K
R315 1K
Q237 2SC2412
R316 220
R317 1K
L229 15μ
C297 120P
Q236 2SC2412
R314 3.9K
R311 22K
C306 10/16
C454 0.1μ
C453 0.1μ
C292 10/16
C294 10/16
C290 47/6.3
R303 100K
C287 0.022
C288 47/6.3
S-VHS
VH6
S12
BAND GAP REF
W/D CLIP
VHS MODE
+B
NOISE CANCEL
PB:Hi
M.CUT (SQUELCH)
CLAMP
FM AGC
LIMIT
FM DE-MOD.
MAIN DE-EMPH
DC DET
MAIN EMPHA
W/D CLIP
FM
S6
VHS
DYNAMIC EMPHA
DETAIL EMPHA
AGC DET
KEYED CLAMP
SYNC SEPA
S3
S1
S2
SYNC EXPAND
VHS REC EQ
S11
12dB AMP SQUELCH
S10
COMP /PB-SEPA
Y/C MIX
S9
PICTURE CONTROL
S5
S7
PB DO
S4
YC-CONT
Y.SEPA
S-VHS MODE
GND
HIC202 HT4921C VIDEO PB PROCESS
R309 1.8K
C305 10/16
C303 10/16
C302 47/6.3
C301 0.47/50
TP304
IC210 RC74HC04M(1/3)
C347 0.1
R345 10K
C328 82P
GND
C381 82P
R402 1K
R407 1K
R452 82K
C382 270P
R401 390
R403 2.7K
C380 270P
EP
SP
SW5
K2
LIM2
SW6
K1
LIM1
SW1
SW3
K3
C313 4.7/25
SW4
DET
IC205 VC2031MP SUB EMPHASIS
TP302
R313 3.3K
R302 22K
TP303
C312 4.7/25
C384 4.7/25
C311 10/16
Q258 2SA1037
R299 2.7K
C307 47P
L248 1μ
R300 2.2K
C403 22/6.3
C402 0.01
L247 100μ
R394 1.5K
Q232 2SC2412
DOC
L243 150μ
R392 1K
C401 68P
C400 68P
R391 4.7K
Q233 2SA1037
RT212 470
R393 560
(3fsc)
L246 100μ
C390 0.01
C392 22/6.3
L245 100μ
C389 0.01
C391 10/16
S/H
CCD (680)
CLAMP
CLOCK DRIVE
WAVE FORM
DUTY DET
IC206 MSM6966M 1H DELAY
C386 47/25
C385 0.33/50
C388 0.01
C387 0.01
VCO
C393 10P
C394 0.01
ENC(P

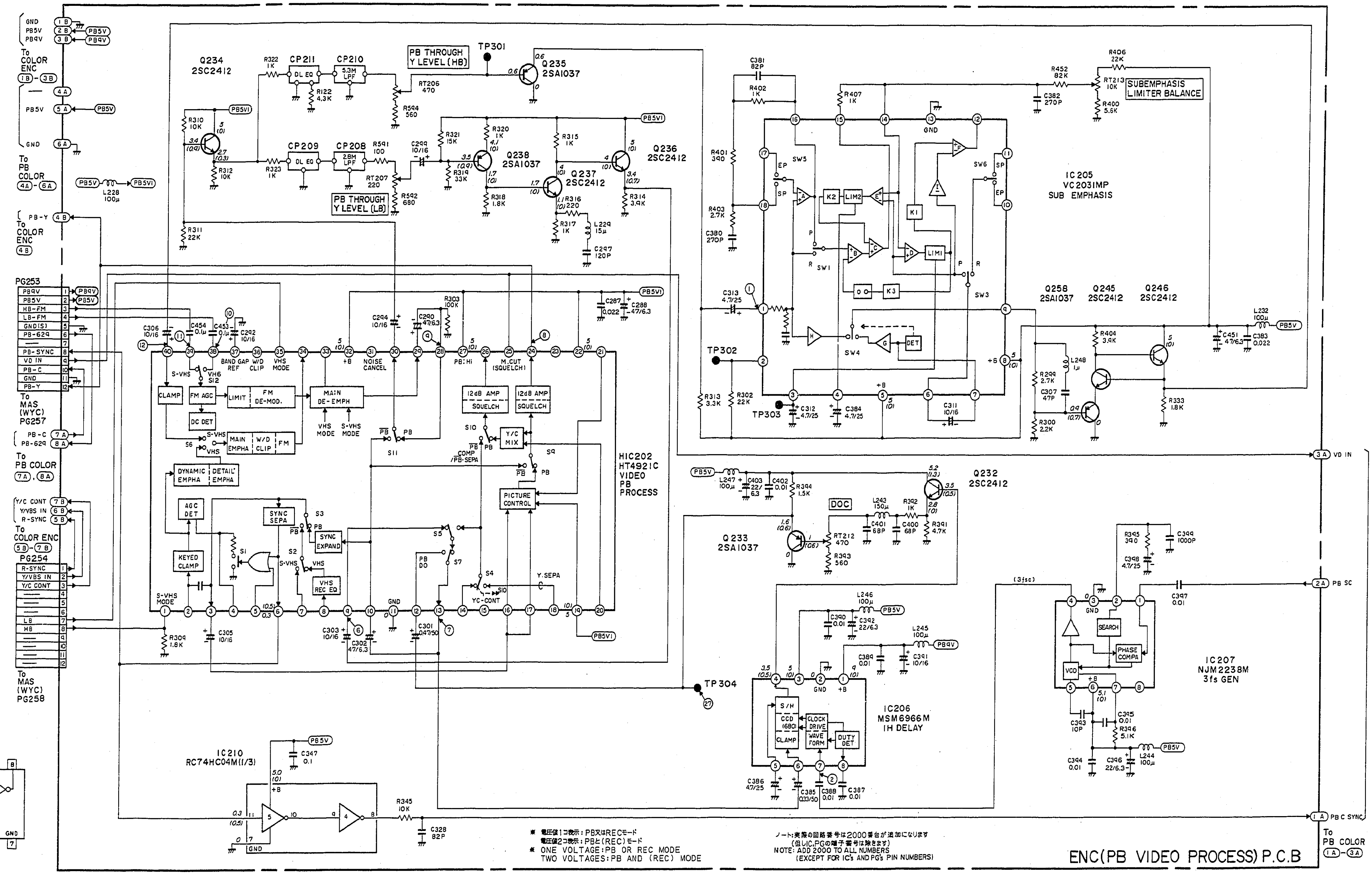
※ 電圧値1コ表示：PB又はRECモード
　電圧値2コ表示：PBと(REC)モード
※ ONE VOLTAGE:PB OR REC MODE
　TWO VOLTAGES:PB AND (REC) MODE

ノート：実際の回路番号は2000番台が追加になります
（但しIC,PGの端子番号は除きます）
NOTE: ADD 2000 TO ALL NUMBERS
(EXCEPT FOR IC's AND PG's PIN NUMBERS)

IC210


14
13
12
11
10
9
8
VDD
GND
1
2
3
4
5
6
7

PB VIDEO PROCESS SCHEMATIC DIAGRAM

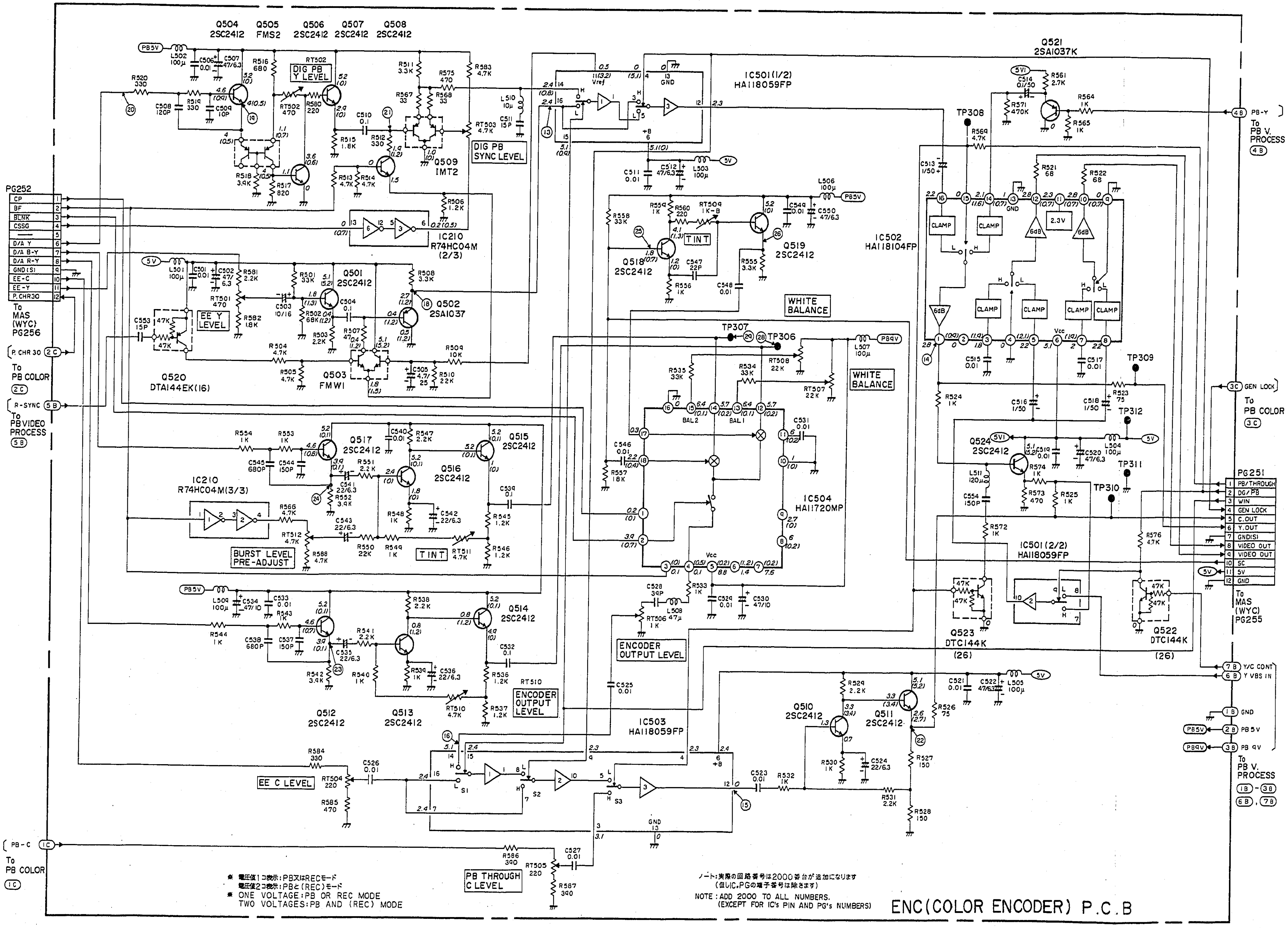


GND 1B
PB5V 2B
PB9V 3B
To COLOR ENC 1B-3B
PB5V 5A
GND 6A
To PB COLOR 4A-6A
L228 100μ
PB-Y 4B
To COLOR ENC 4B
PG253
PB9V
PB5V
HB-FM
LB-FM
GND(S)
PB-629
PB-SYNC
VD IN
PB-C
GND
PB-Y
To MAS (WYC) PG257
PB-C 7A
PB-629 8A
To PB COLOR 7A, 8A
Y/C CONT 7B
Y/VBS IN 6B
R-SYNC 5B
To COLOR ENC 5B-7B
PG254
R-SYNC
Y/VBS IN
Y/C CONT
LB
HB
To MAS (WYC) PG258
Q234 2SC2412
CP211 DL EQ
CP210 5.3M LPF
CP209 DL EQ
CP208 2.8M LPF
PB THROUGH Y LEVEL (HB)
PB THROUGH Y LEVEL (LB)
TP301
Q235 2SA1037
Q238 2SA1037
Q237 2SC2412
Q236 2SC2412
RT206 470
RT207 220
HIC202 HT4921C VIDEO PB PROCESS
CLAMP
FM AGC
LIMIT
FM DE-MOD.
MAIN DE-EMPH
DC DET
MAIN EMPHA
W/D CLIP
FM
DYNAMIC EMPHA
DETAIL EMPHA
AGC DET
KEYED CLAMP
SYNC SEPA
SYNC EXPAND
VHS REC EQ
12dB AMP SQUELCH
Y/C MIX
PICTURE CONTROL
BAND GAP REF
W/D CLIP
VHS MODE
NOISE CANCEL
PB:Hi
M.CUT (SQUELCH)
S-VHS MODE
COMP /PB·SEPA
Y.SEPA
YC-CONT
IC205 VC2031MP SUB EMPHASIS
SUBEMPHASIS LIMITER BALANCE
RT213 10K
K1
K2
K3
LIM1
LIM2
DET
SW1
SW3
SW4
SW5
SW6
TP302
TP303
TP304
Q258 2SA1037
Q245 2SC2412
Q246 2SC2412
L232 100μ
Q232 2SC2412
Q233 2SA1037
DOC
RT212 470
IC206 MSM6966M 1H DELAY
S/H
CCD (680)
CLAMP
CLOCK DRIVE WAVE FORM
DUTY DET
IC207 NJM2238M 3fs GEN
SEARCH
PHASE COMPA
VCO
IC210 RC74HC04M(1/3)
VD IN 3A
PB SC 2A
PB C SYNC 1A
To PB COLOR 1A-3A
ENC(PB VIDEO PROCESS) P.C.B

✱ 電圧値1つ表示：PB又はRECモード
電圧値2つ表示：PBと(REC)モード
✱ ONE VOLTAGE: PB OR REC MODE
TWO VOLTAGES: PB AND (REC) MODE

ノート：実際の回路番号は2000番台が追加になります
(但しIC,PGの端子番号は除きます)
NOTE: ADD 2000 TO ALL NUMBERS
(EXCEPT FOR IC's AND PG's PIN NUMBERS)

LOR ENCODER SCHEMATIC DIAGRAM

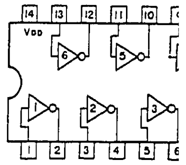

Q504 2SC2412
Q505 FMS2
Q506 2SC2412
Q507 2SC2412
Q508 2SC2412
DIG PB Y LEVEL
DIG PB SYNC LEVEL
Q509 IMT2
Q521 2SA1037K
IC501(1/2) HA118059FP
IC210 R74HC04M (2/3)
PG252
CP
BF
BLNK
CSSG
D/A Y
D/A B-Y
D/A R-Y
GND(S)
EE-C
EE-Y
P.CHR30
To MAS (WYC) PG256
P.CHR 30 2C
To PB COLOR 2C
R-SYNC 5B
To PB VIDEO PROCESS 5B
Q501 2SC2412
Q502 2SA1037
Q503 FMW1
Q520 DTA144EK(16)
EE Y LEVEL
Q518 2SC2412
Q519 2SC2412
TINT
WHITE BALANCE
IC502 HA118104FP
TP308
TP307
TP306
TP309
TP312
TP311
TP310
CLAMP
6dB
2.3V
PB-Y 4B
To PB V. PROCESS 4B
IC210 R74HC04M(3/3)
Q517 2SC2412
Q515 2SC2412
Q516 2SC2412
BURST LEVEL PRE-ADJUST
IC504 HA11720MP
BAL2
BAL1
Q524 2SC2412
IC501(2/2) HA118059FP
Q523 DTC144K (26)
Q522 DTC144K (26)
GEN LOCK 3C
To PB COLOR 3C
PG251
PB/THROUGH
DG/PB
WIN
GEN LOCK
C.OUT
Y.OUT
GND(S)
VIDEO OUT
VIDEO OUT
SC
5V
GND
To MAS (WYC) PG255
Y/C CONT 7B
Y VBS IN 6B
GND 1B
PB5V 2B
PB9V 3B
To PB V. PROCESS 1B-3B 6B, 7B
Q514 2SC2412
Q512 2SC2412
Q513 2SC2412
ENCODER OUTPUT LEVEL
RT510
ENCODER OUTPUT LEVEL
IC503 HA118059FP
Q510 2SC2412
Q511 2SC2412
EE C LEVEL
PB-C 1C
To PB COLOR 1C
PB THROUGH C LEVEL
GND 13

※ 電圧値1コ表示：PB又はRECモード
電圧値2コ表示：PBと（REC）モード
※ ONE VOLTAGE：PB OR REC MODE
TWO VOLTAGES：PB AND (REC) MODE

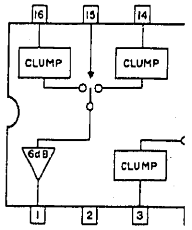
ノート：実際の回路番号は2000番台が追加になります
（但しIC，PGの端子番号は除きます）
NOTE：ADD 2000 TO ALL NUMBERS.
(EXCEPT FOR IC's PIN AND PG's NUMBERS)

ENC(COLOR ENCODER) P.C.B

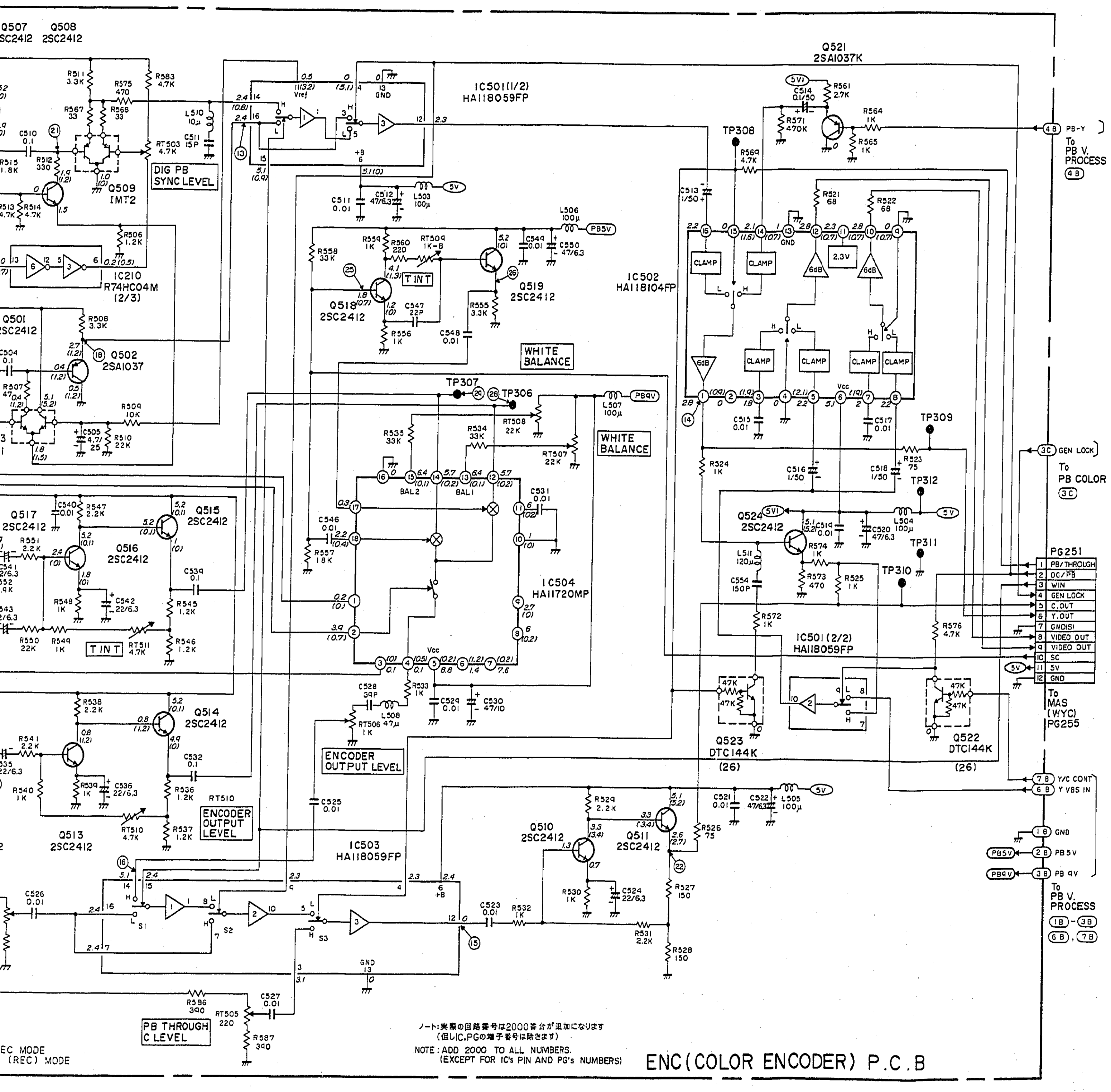
IC210


14
13
12
11
10
Vᴅᴅ
1
2
3
4
5
6

IC501, 503


16
15
14
CLUMP
CLUMP
6dB
CLUMP
1
2
3

AUD
AUD
COL
DIG-
DIG-
DIG-
DMD
FUN
IPP
JACI
PB C
PB V
PBK
PRE
REG
REG
REM
SC-
SERV
SPF
SYST
SYST
T/S
VID-
VID-
WYC

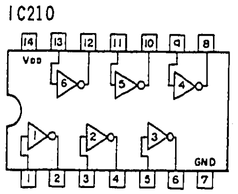

Q507 2SC2412
Q508 2SC2412
R511 3.3K
R575 470
R583 4.7K
R567 33
R568 33
C510 0.1
R512 330
R515 1.8K
Q509 IMT2
RT503 4.7K
DIG PB SYNC LEVEL
L510 10μ
C511 15P
R513 4.7K
R514 4.7K
R506 1.2K
IC210 R74HC04M (2/3)
Q501 2SC2412
R508 3.3K
Q502 2SA1037
R507 47
R509 10K
C505 4.7/25
R510 22K
IC501(1/2) HA118059FP
GND
Vref
C511 0.01
C512 47/6.3
L503 100μ
5V
R558 33K
R559 1K
R560 220
RT509 1K-B
TINT
C549 0.01
C550 47/6.3
L506 100μ
PB5V
Q518 2SC2412
Q519 2SC2412
C547 22P
R555 3.3K
R556 1K
C548 0.01
WHITE BALANCE
TP307
TP306
RT508 22K
L507 100μ
PB9V
R535 33K
R534 33K
RT507 22K
WHITE BALANCE
BAL2
BAL1
C531 0.01
C546 0.01
R557 18K
IC504 HA11720MP
Vcc
C528 39P
R533 1K
RT506 1K
L508 47μ
C529 0.01
C530 47/10
ENCODER OUTPUT LEVEL
Q517 2SC2412
C540 0.01
R547 2.2K
Q515 2SC2412
R551 2.2K
Q516 2SC2412
C539 0.1
R548 1K
C542 22/6.3
R545 1.2K
R550 22K
R549 1K
TINT
RT511 4.7K
R546 1.2K
R538 2.2K
Q514 2SC2412
R541 2.2K
C532 0.1
R539 1K
C536 22/6.3
R536 1.2K
R540 1K
RT510
ENCODER OUTPUT LEVEL
Q513 2SC2412
RT510 4.7K
R537 1.2K
C525 0.01
IC503 HA118059FP
C526 0.01
S1
S2
S3
GND
R586 390
RT505 220
C527 0.01
R587 390
PB THROUGH C LEVEL
EC MODE
(REC) MODE
Q521 2SA1037K
5V1
C514 0.1/50
R561 2.7K
R564 1K
R565 1K
R571 470K
TP308
R569 4.7K
C513 1/50
IC502 HA118104FP
R521 68
R522 68
CLAMP
6dB
2.3V
C515 0.01
C517 0.01
TP309
R523 75
R524 1K
C516 1/50
C518 1/50
TP312
Q524 2SC2412
C519 0.01
C520 47/6.3
L504 100μ
5V
L511 120μ
R574 1K
C554 150P
R573 470
R525 1K
TP311
TP310
R572 1K
IC501(2/2) HA118059FP
R576 4.7K
47K
Q523 DTC144K (26)
Q522 DTC144K (26)
Q510 2SC2412
Q511 2SC2412
R529 2.2K
C521 0.01
C522 47/6.3
L505 100μ
R526 75
R530 1K
C524 22/6.3
R527 150
C523 0.01
R532 1K
R531 2.2K
R528 150
4B PB-Y
To PB V. PROCESS 4B
3C GEN LOCK
To PB COLOR 3C
PG251
1 PB/THROUGH
2 DC/PB
3 WIN
4 GEN LOCK
5 C.OUT
6 Y.OUT
7 GND(S)
8 VIDEO OUT
9 VIDEO OUT
10 SC
11 5V
12 GND
To MAS (WYC) PG255
7B Y/C CONT
6B Y VBS IN
1B GND
2B PB 5V
3B PB 9V
To PB V. PROCESS 1B-3B 6B, 7B
4
5
6
7
8
9
10
11

ノート:実際の回路番号は2000番台が追加になります
（但しIC,PGの端子番号は除きます）

NOTE : ADD 2000 TO ALL NUMBERS.
(EXCEPT FOR IC's PIN AND PG's NUMBERS)

ENC(COLOR ENCODER) P.C.B

IC210


14
13
12
11
10
9
8
Vdd
GND
1
2
3
4
5
6
7

IC501, 503

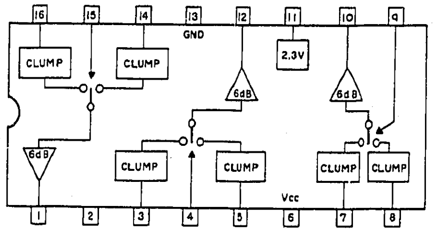
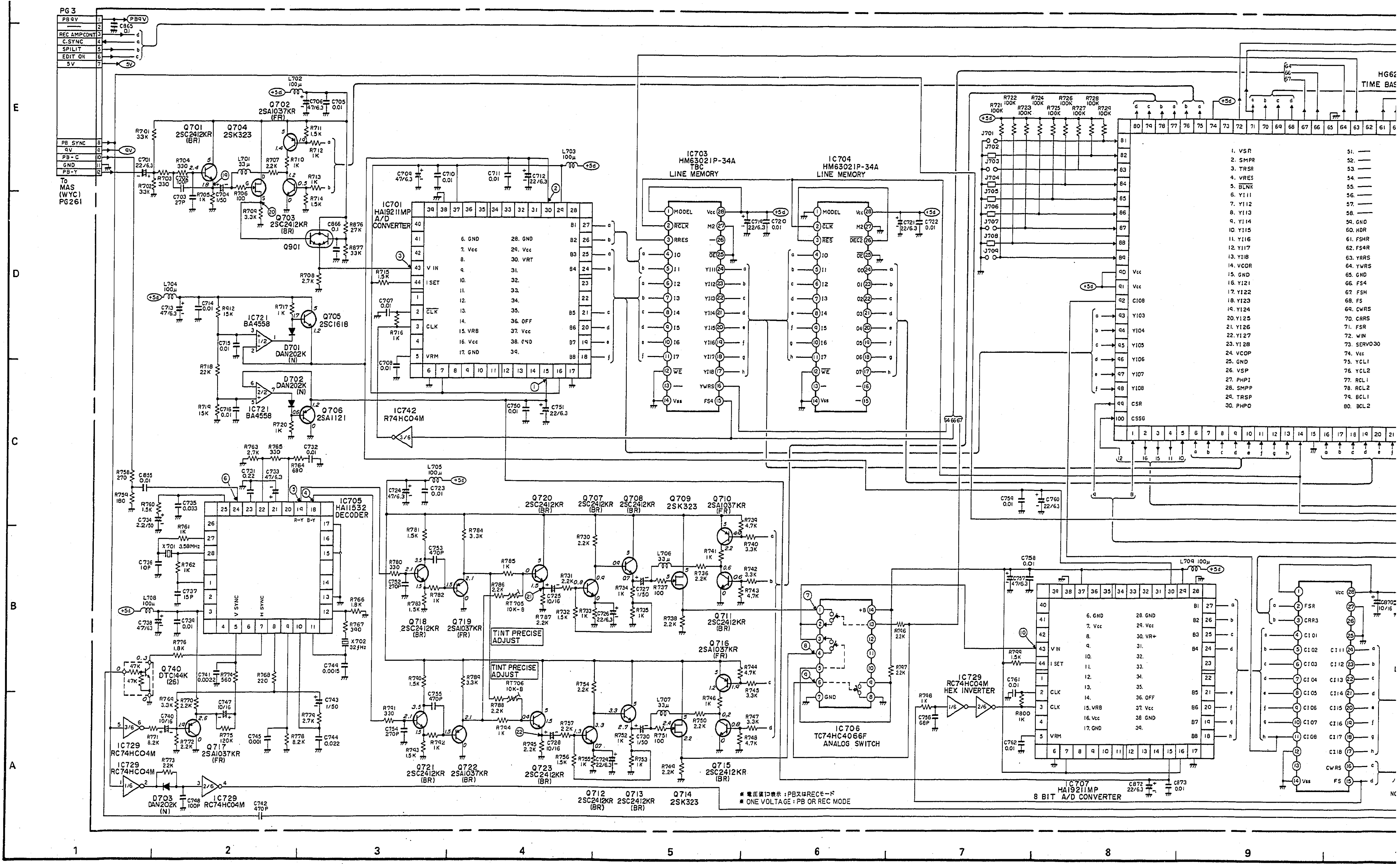
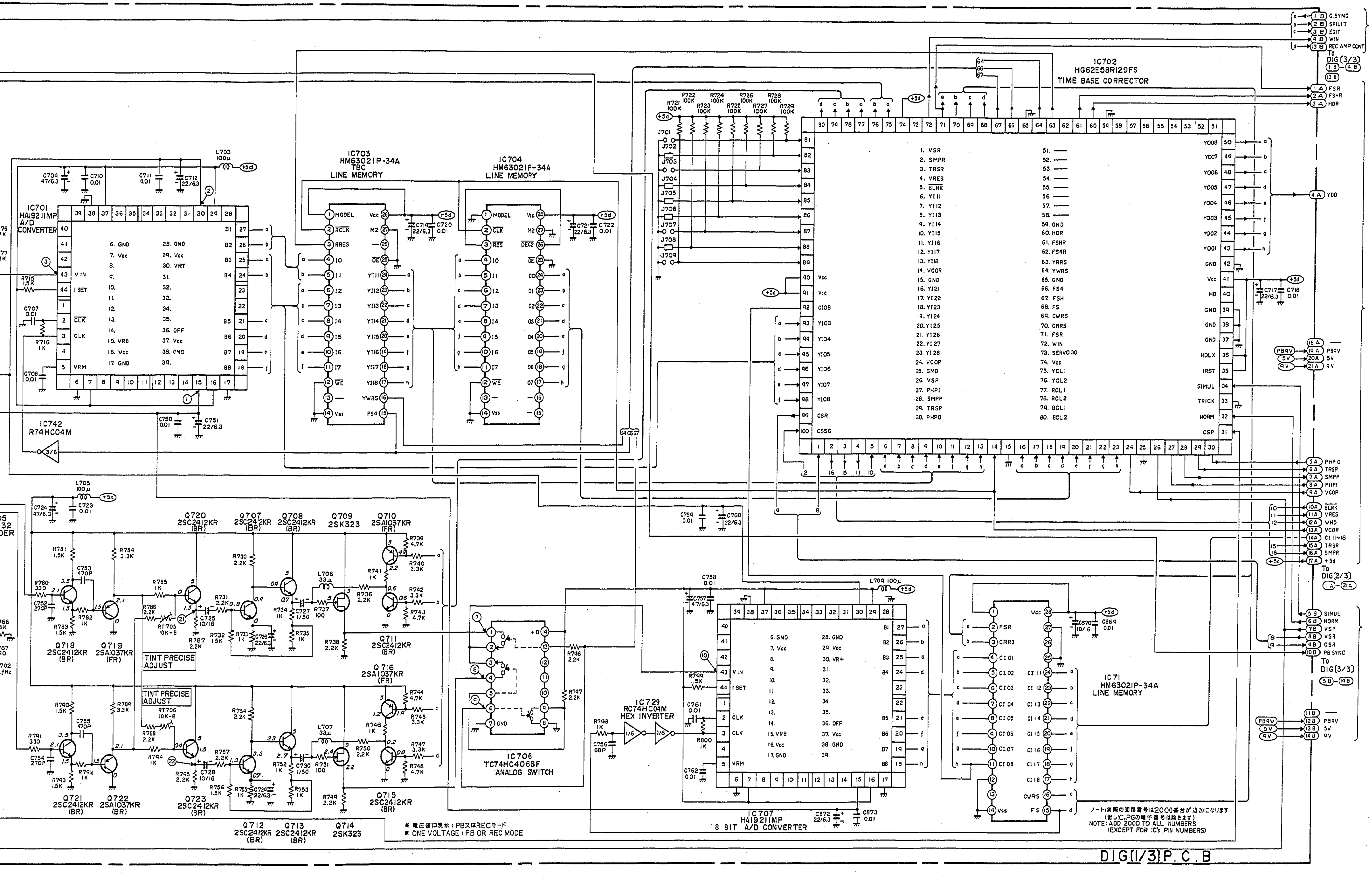

16
15
14
13
12
11
10
9
GND
CLUMP
6dB
2.3V
Vcc
1
2
3
4
5
6
7
8

DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO-Ⅰ	5-33	5-68
AUDIO-Ⅱ	5-36	5-68
COLOR ENCODER	5-49	5-74
DIG-1/3	5-52	5-76
DIG-2/3	5-55	5-76
DIG-3/3	5-58	5-76
DMD	5-18	5-82
FUNCTION SW	5-9	5-64
IPP	5-32	5-71
JACK	5-30	5-68
PB COLOR PROCESS	5-44	5-74
PB VIDEO	5-46	5-74
PBK	5-12	5-64
PREAMP	5-13	–
REG	5-20	5-66
REG(MAS)	5-31	5-68
REM	5-16	5-67
SC	5-26/31	5-71
SERVO	5-27	5-68
SPF	5-15	5-66
SYSTEM CONTROL-Ⅰ	5-21	5-68
SYSTEM CONTROL-Ⅱ	5-24	5-68
T/S	5-23	5-68
VID-1/2	5-39	5-72
VID-1/2	5-42	5-72
WYC	5-25	5-68

DIG−1/3 SCHEMATIC DIAGRAM

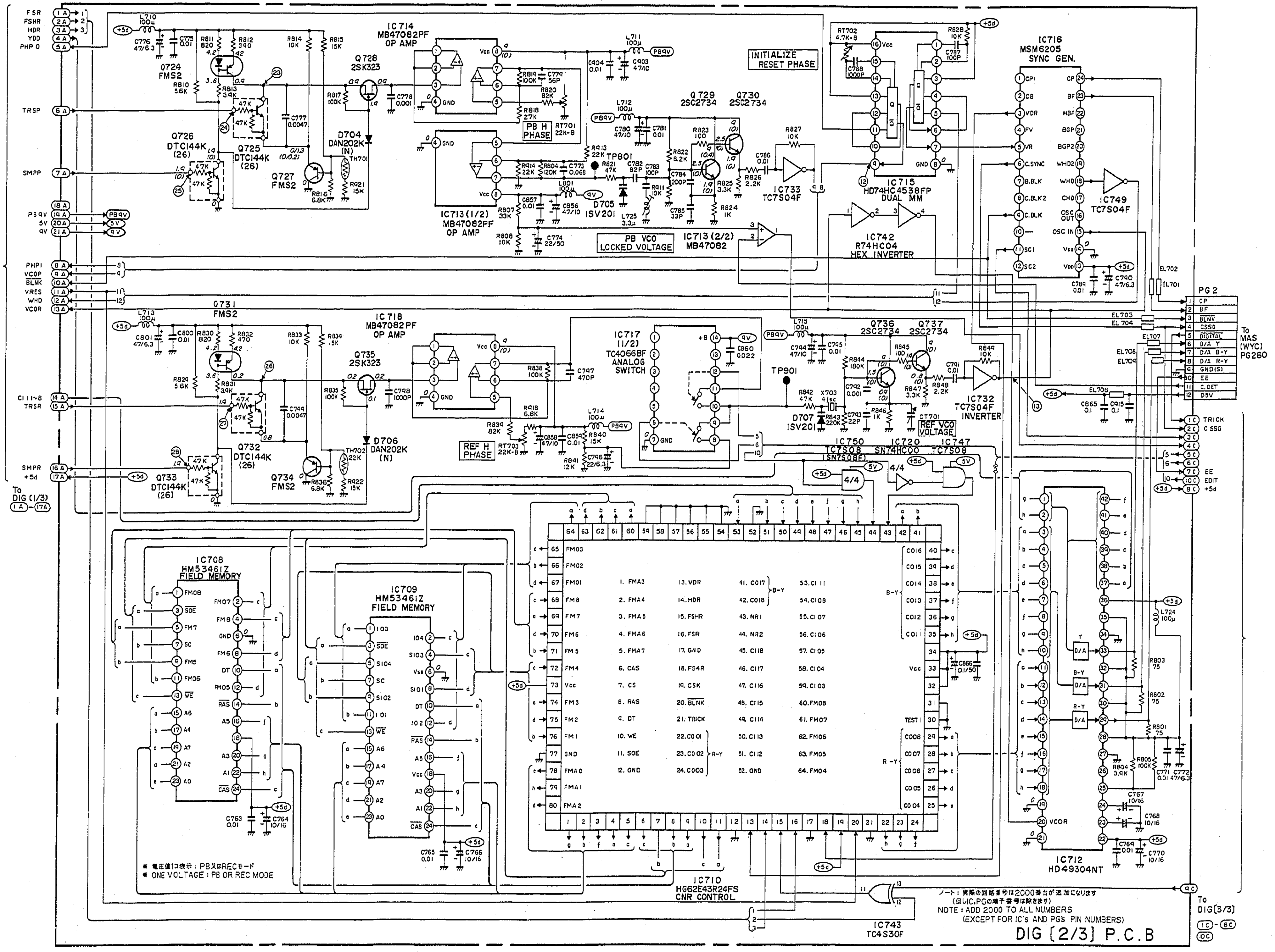

PG3
PB9V
REC AMPCONT
C.SYNC
SPILIT
EDIT ON
5V
PB SYNC
9V
PB-C
GND
PB-Y
To MAS (WYC) PG261
Q701 2SC2412KR (BR)
Q704 2SK323
Q702 2SA1037KR (FR)
Q703 2SC2412KR (BR)
Q901
IC701 HA19211MP A/D CONVERTER
IC703 HM63021P-34A TBC LINE MEMORY
IC704 HM63021P-34A LINE MEMORY
HG62
TIME BAS
Q705 2SC1618
IC721 BA4558
D701 DAN202K (N)
D702 DAN202K (N)
Q706 2SA1121
IC742 R74HC04M
IC705 HA11532 DECODER
X701 3.58MHz
X702 32fHz
Q740 DTC144K (26)
Q717 2SA1037KR (FR)
IC729 RC74HC04M
D703 DAN202K (N)
Q720 2SC2412KR (BR)
Q707 2SC2412KR (BR)
Q708 2SC2412KR (BR)
Q709 2SK323
Q710 2SA1037KR (FR)
Q718 2SC2412KR (BR)
Q719 2SA1037KR (FR)
TINT PRECISE ADJUST
Q711 2SC2412KR (BR)
Q716 2SA1037KR (FR)
Q721 2SC2412KR (BR)
Q722 2SA1037KR (BR)
Q723 2SC2412KR (BR)
Q712 2SC2412KR (BR)
Q713 2SC2412KR (BR)
Q714 2SK323
Q715 2SC2412KR (BR)
IC706 TC74HC4066F ANALOG SWITCH
IC729 RC74HC04M HEX INVERTER
IC707 HA19211MP 8 BIT A/D CONVERTER
※ 電圧値1つ表示：PB又はRECモード
※ ONE VOLTAGE : PB OR REC MODE
E
D
C
B
A
1
2
3
4
5
6
7
8
9


IC701
HA19211MP
A/D CONVERTER
IC703
HM63021P-34A
TBC
LINE MEMORY
IC704
HM63021P-34A
LINE MEMORY
IC702
HG62E58R129FS
TIME BASE CORRECTOR
IC742
R74HC04M
IC706
TC74HC4066F
ANALOG SWITCH
IC729
RC74HC04M
HEX INVERTER
IC707
HA19211MP
8 BIT A/D CONVERTER
IC71
HM63021P-34A
LINE MEMORY
Q720 2SC2412KR (BR)
Q707 2SC2412KR (BR)
Q708 2SC2412KR (BR)
Q709 2SK323
Q710 2SA1037KR (FR)
Q718 2SC2412KR (BR)
Q719 2SA1037KR (FR)
Q711 2SC2412KR (BR)
Q716 2SA1037KR (FR)
Q721 2SC2412KR (BR)
Q722 2SA1037KR (BR)
Q723 2SC2412KR (BR)
Q712 2SC2412KR (BR)
Q713 2SC2412KR (BR)
Q714 2SK323
Q715 2SC2412KR (BR)
TINT PRECISE ADJUST
RT705 10K-B
RT706 10K-B
L703 100µ
L705 100µ
L706 33µ
L707 33µ
L709 100µ
+5d
C.SYNC
SPILIT
EDIT
WIN
REC AMP CONT
To DIG(3/3) (1B)-(4B) (13B)
FSR
FSHR
HDR
YDD
PB9V
5V
9V
PHPO
TRSP
SMPP
PHPI
VCOP
BLNK
VRES
WHD
VCOR
CI 11~18
TRSR
SMPR
+5d
To DIG(2/3) (1A)-(21A)
SIMUL
NORM
VSP
VSR
CSR
PB SYNC
To DIG(3/3) (5B)-(14B)
DIG[1/3]P.C.B
3
4
5
6
7
8
9
10
11

※ 電圧値の表示：PB又はRECモード
※ ONE VOLTAGE : PB OR REC MODE

ノート:実際の回路番号は2000番台が追加になります
(但しIC,PGの端子番号は除きます)
NOTE: ADD 2000 TO ALL NUMBERS
(EXCEPT FOR IC's PIN NUMBERS)

G-2/3 SCHEMATIC DIAGRAM


FSR
FSHR
HDR
YDD
PHP 0
TRSP
SMPP
PB9V
5V
9V
PHP1
VCOP
BLNK
VRES
WHD
VCOR
CI 11~8
TRSR
SMPR
+5d
To DIG (1/3) 1A - 17A
IC714 MB47082PF OP AMP
Q728 2SK323
Q724 FMS2
Q726 DTC144K (26)
Q725 DTC144K (26)
Q727 FMS2
D704 DAN202K (N)
TH701
PB H PHASE
RT701 22K-B
IC713 (1/2) MB47082PF OP AMP
IC713 (2/2) MB47082
TP801
D705 1SV201
PB VCO LOCKED VOLTAGE
Q729 2SC2734
Q730 2SC2734
IC733 TC7S04F
INITIALIZE RESET PHASE
RT702 4.7K-B
IC715 HD74HC4538FP DUAL MM
IC742 R74HC04 HEX INVERTER
IC716 MSM6205 SYNC GEN.
IC749 TC7S04F
Q731 FMS2
IC718 MB47082PF OP AMP
Q735 2SK323
Q732 DTC144K (26)
Q733 DTC144K (26)
Q734 FMS2
D706 DAN202K (N)
TH702 22K
REF H PHASE
RT703 22K-B
IC717 (1/2) TC4066BF ANALOG SWITCH
TP901
D707 1SV201
X703 4fsc
CT701 REF VCO VOLTAGE
Q736 2SC2734
Q737 2SC2734
IC732 TC7S04F INVERTER
IC750 TC7S08 (SN7S08F)
IC720 SN74HC00
IC747 TC7S08
PG2
CP
BF
BLNK
CSSG
DIGITAL
D/A Y
D/A B-Y
D/A R-Y
GND(S)
EE
C.DET
D5V
To MAS (WYC) PG260
TRICK
C SSG
EE
EDIT
+5d
IC708 HM53461Z FIELD MEMORY
IC709 HM53461Z FIELD MEMORY
IC710 HG62E43R24FS CNR CONTROL
IC712 HD49304NT
IC743 TC4S30F
To DIG(3/3) 1C - 8C 10C
9C
※ 電圧値1つ表示：PB又はRECモード
※ ONE VOLTAGE : PB OR REC MODE
DIG [2/3] P.C.B
1
2
3
4
5
6
7
8
9
10

ノート：実際の回路番号は2000番台が追加になります
（但しIC,PGの端子番号は除きます）
NOTE : ADD 2000 TO ALL NUMBERS
(EXCEPT FOR IC's AND PG's PIN NUMBERS)

DIAGRAM CONFIGURATION

AUDIO-Ⅰ
AUDIO-Ⅱ
COLOR ENCODER
DIG-1/3
DIG-2/3
DIG-3/3
DMD
FUNCTION SW
IPP
JACK
PB COLOR PROCESS
PB VIDEO
PBK
PREAMP
REG
REG(MAS)
REM
SC
SERVO
SPF
SYSTEM CONTROL-Ⅰ
SYSTEM CONTROL-Ⅱ
T/S
VID-1/2
VID-1/2
WYC

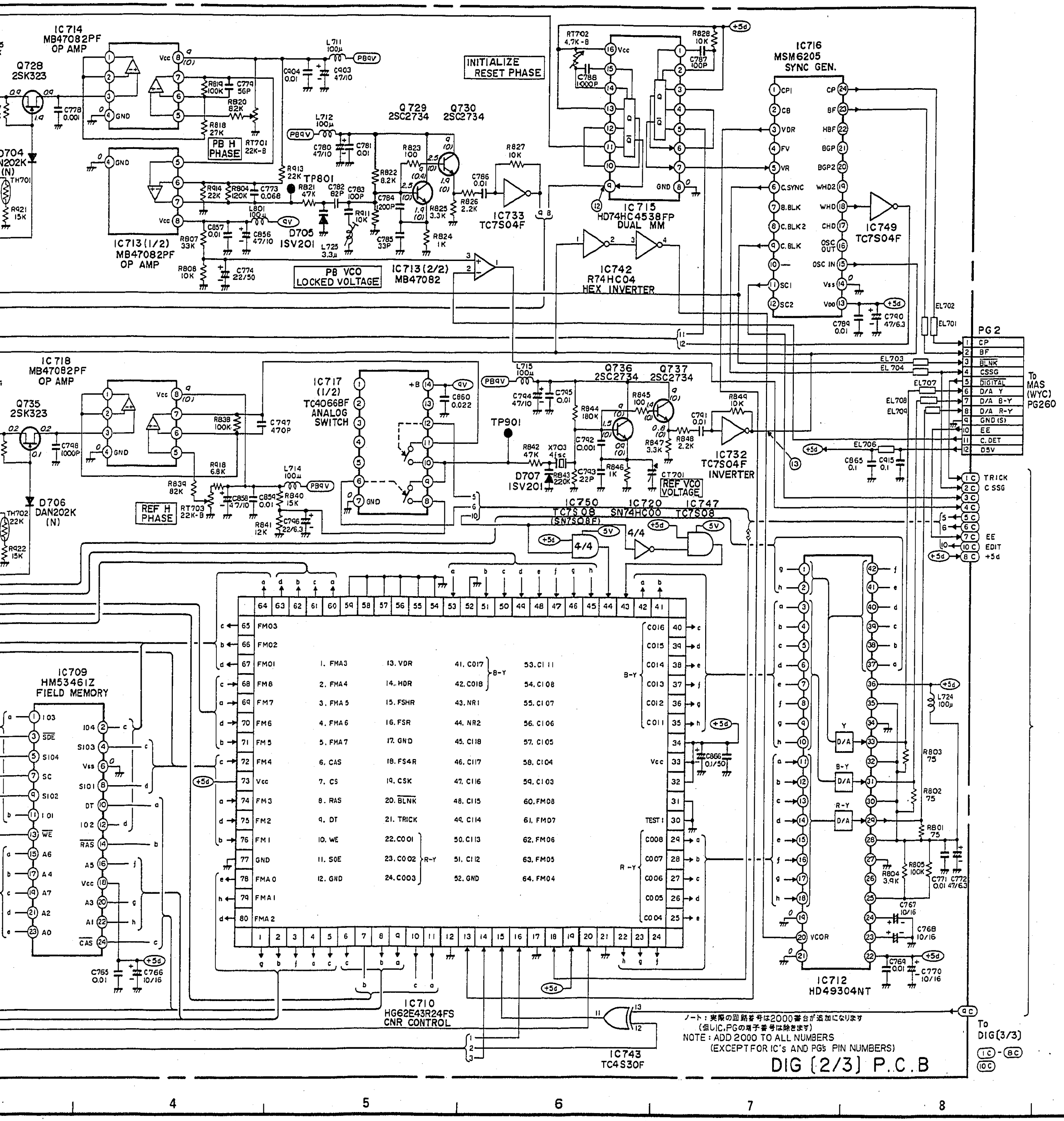
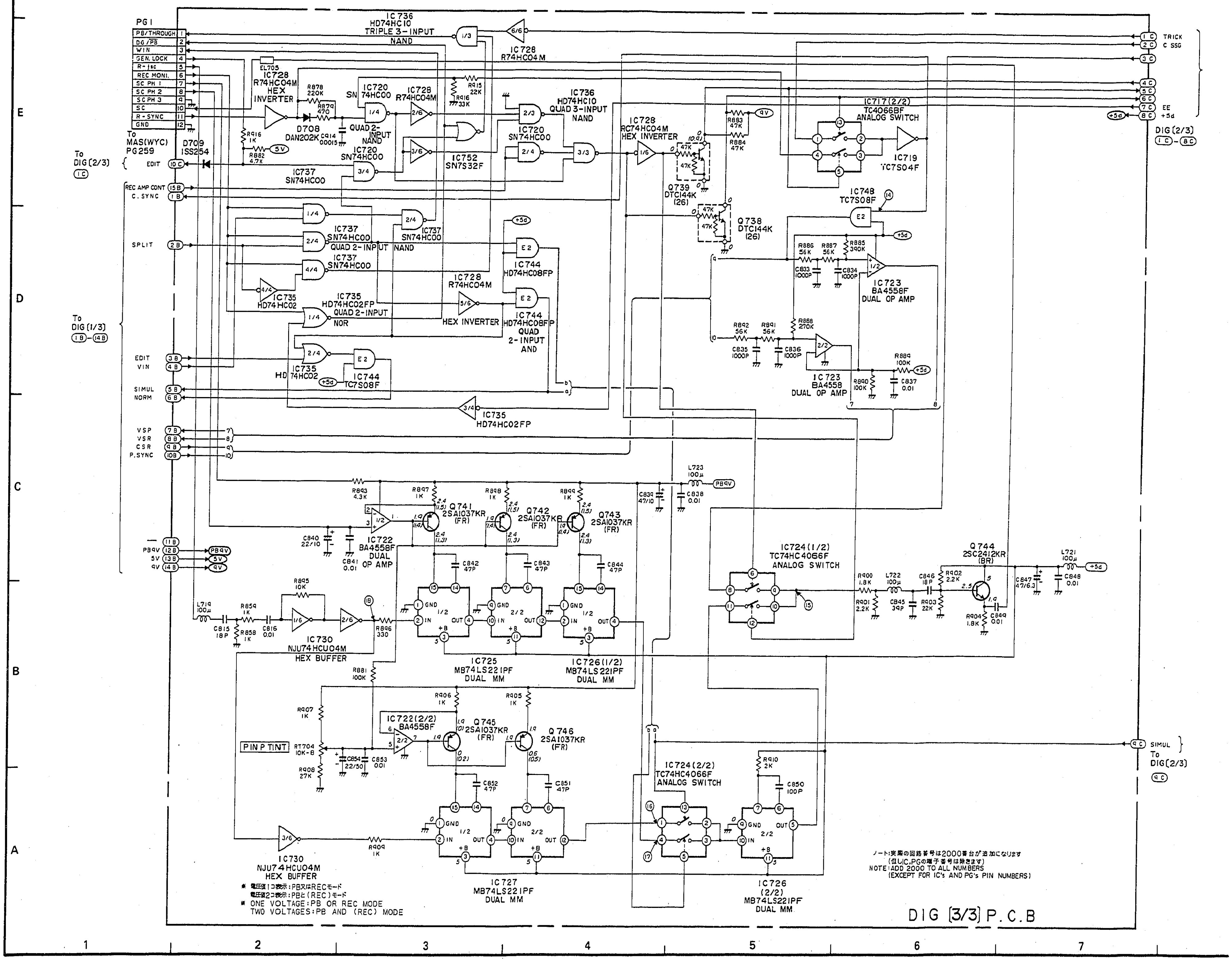

IC714
MB47082PF
OP AMP
Q728
2SK323
IC713(1/2)
MB47082PF
OP AMP
PB H PHASE
RT701 22K-B
TP801
D705
1SV201
PB VCO LOCKED VOLTAGE
IC713(2/2)
MB47082
Q729
2SC2734
Q730
2SC2734
IC733
TC7S04F
INITIALIZE RESET PHASE
IC715
HD74HC4538FP
DUAL MM
IC742
R74HC04
HEX INVERTER
IC716
MSM6205
SYNC GEN.
IC749
TC7S04F
PG2
CP
BF
BLNK
CSSG
DIGITAL
D/A Y
D/A B-Y
D/A R-Y
GND(S)
EE
C.DET
D5V
To MAS (WYC) PG260
IC718
MB47082PF
OP AMP
Q735
2SK323
D706
DAN202K
(N)
REF H PHASE
RT703 22K-B
IC717
(1/2)
TC4066BF
ANALOG SWITCH
TP901
D707
1SV201
Q736
2SC2734
Q737
2SC2734
REF VCO VOLTAGE
IC732
TC7S04F
INVERTER
IC750
TC7S08
(SN7S08F)
IC720
SN74HC00
IC747
TC7S08
TRICK
C SSG
EE
EDIT
+5d
IC709
HM53461Z
FIELD MEMORY
IC710
HG62E43R24FS
CNR CONTROL
IC743
TC4S30F
IC712
HD49304NT
To DIG(3/3)
1C - 8C
10C
ノート：実際の回路番号は2000番台が追加になります
（但しIC,PGの端子番号は除きます）
NOTE : ADD 2000 TO ALL NUMBERS
(EXCEPT FOR IC's AND PG's PIN NUMBERS)
DIG [2/3] P.C.B
4
5
6
7
8
9
10
11

DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO-Ⅰ	5-33	5-68
AUDIO-Ⅱ	5-36	5-68
COLOR ENCODER	5-49	5-74
DIG-1/3	5-52	5-76
DIG-2/3	5-55	5-76
DIG-3/3	5-58	5-76
DMD	5-18	5-62
FUNCTION SW	5-9	5-64
IPP	5-32	5-71
JACK	5-30	5-68
PB COLOR PROCESS	5-44	5-74
PB VIDEO	5-46	5-74
PBK	5-12	5-34
PREAMP	5-13	-
REG	5-20	5-66
REG(MAS)	5-31	5-68
REM	5-16	5-67
SC	5-26/31	5-71
SERVO	5-27	5-68
SPF	5-15	5-66
SYSTEM CONTROL-Ⅰ	5-21	5-68
SYSTEM CONTROL-Ⅱ	5-24	5-68
T/S	5-23	5-68
VID-1/2	5-39	5-72
VID-1/2	5-42	5-72
WYC	5-25	5-68

DIG－3／3 SCHEMATIC DIAGRAM

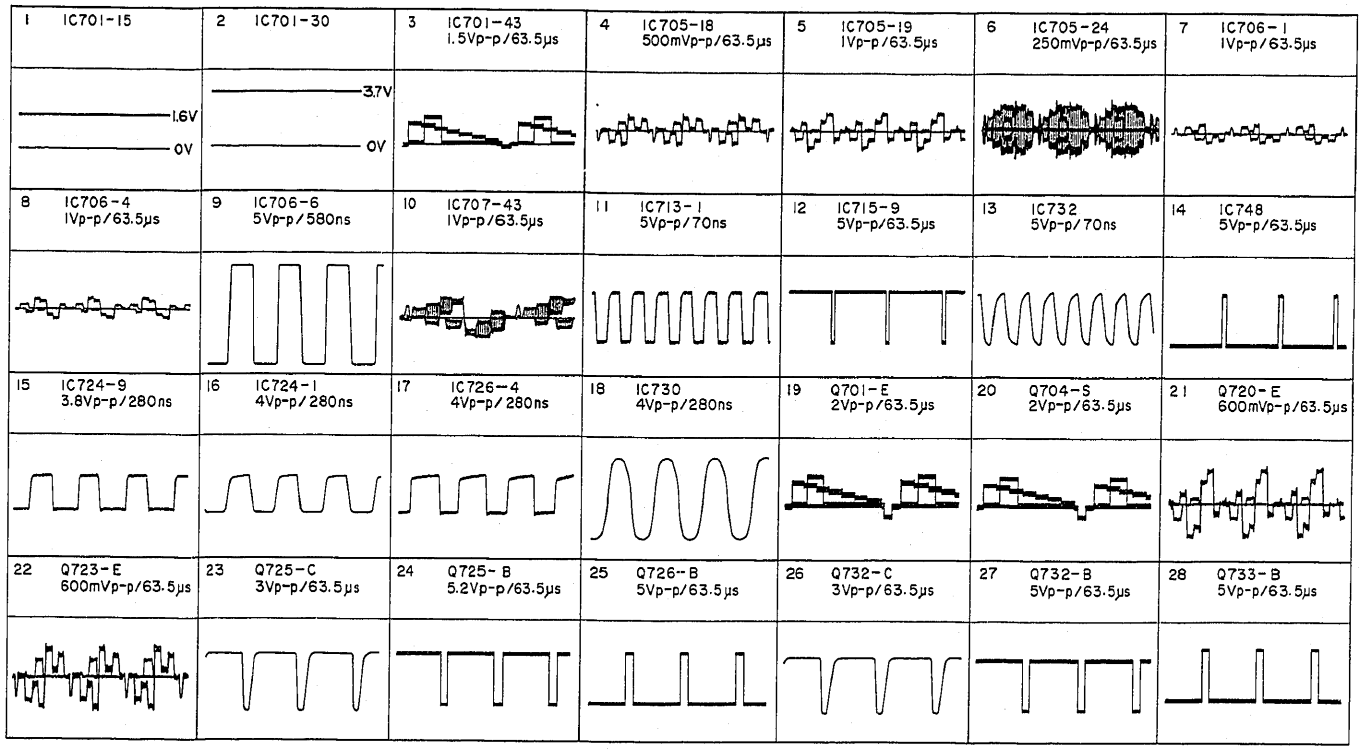

PG1
PB/THROUGH
DG/PB
WIN
GEN. LOCK
R-fsc
REC MONI.
SC PH 1
SC PH 2
SC PH 3
SC
R-SYNC
GND
To MAS(WYC) PG259
To DIG(2/3) 1C
EDIT
REC AMP CONT
C. SYNC
SPLIT
To DIG(1/3) 1B-14B
EDIT
VIN
SIMUL
NORM
VSP
VSR
CSR
P.SYNC
PB9V
5V
9V
IC736 HD74HC10 TRIPLE 3-INPUT NAND
IC728 R74HC04M
IC728 R74HC04M HEX INVERTER
D708 DAN202K
IC720 SN74HC00 QUAD 2-INPUT NAND
IC752 SN7S32F
D709 1SS254
IC737 SN74HC00
IC736 HD74HC10 QUAD 3-INPUT NAND
IC728 RC74HC04M HEX INVERTER
Q739 DTC144K (26)
Q738 DTC144K (26)
IC717(2/2) TC4066BF ANALOG SWITCH
IC719 TC7S04F
IC748 TC7S08F
IC737 SN74HC00 QUAD 2-INPUT NAND
IC744 HD74HC08FP
IC744 HD74HC08FP QUAD 2-INPUT AND
IC735 HD74HC02
IC735 HD74HC02FP QUAD 2-INPUT NOR
IC728 R74HC04M HEX INVERTER
IC744 TC7S08F
IC735 HD74HC02FP
IC723 BA4558F DUAL OP AMP
IC723 BA4558 DUAL OP AMP
TRICK
C SSG
EE
+5d
DIG(2/3) 1C-8C
Q741 2SA1037KR (FR)
Q742 2SA1037KR (FR)
Q743 2SA1037KR (FR)
IC722 BA4558F DUAL OP AMP
L723 100µ
IC724(1/2) TC74HC4066F ANALOG SWITCH
Q744 2SC2412KR (BR)
L721 100µ
L722 100µ
L719 100µ
IC730 NJU74HCU04M HEX BUFFER
IC725 MB74LS221PF DUAL MM
IC726(1/2) MB74LS221PF DUAL MM
PIN P TINT
RT704 10K-B
IC722(2/2) BA4558F
Q745 2SA1037KR (FR)
Q746 2SA1037KR (FR)
IC724(2/2) TC74HC4066F ANALOG SWITCH
IC727 MB74LS221PF DUAL MM
IC726 (2/2) MB74LS221PF DUAL MM
SIMUL To DIG(2/3) 9C
IC730 NJU74HCU04M HEX BUFFER
E
D
C
B
A
1
2
3
4
5
6
7

＊ 電圧値1コ表示：PB又はRECモード
電圧値2コ表示：PBと（REC）モード
＊ ONE VOLTAGE：PB OR REC MODE
TWO VOLTAGES：PB AND (REC) MODE

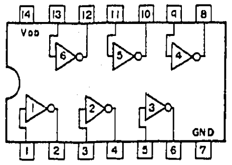
ノート：実際の回路番号は2000番台が追加になります
（但しIC,PGの端子番号は除きます）
NOTE：ADD 2000 TO ALL NUMBERS
(EXCEPT FOR IC's AND PG's PIN NUMBERS)

DIG [3/3] P.C.B

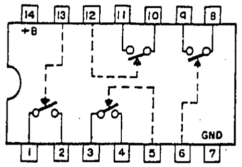
DIG WAVEFORMS



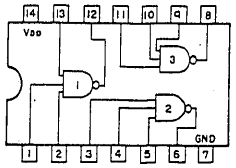
IC719, 728, 729, 730
IC732, 733, 742, 749


14 13 12 11 10 9 8
VDD
GND
1 2 3 4 5 6 7

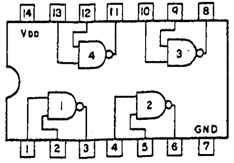
IC724


14 13 12 11 10 9 8
+B
GND
1 2 3 4 5 6 7

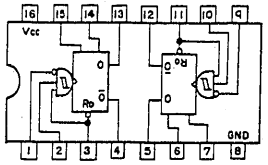
IC736


14 13 12 11 10 9 8
VDD
GND
1 2 3 4 5 6 7

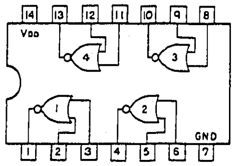
IC720, 737


14 13 12 11 10 9 8
VDD
GND
1 2 3 4 5 6 7

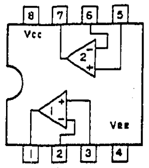
IC725, 726, 727


16 15 14 13 12 11 10 9
Vcc
Ro
GND
1 2 3 4 5 6 7 8

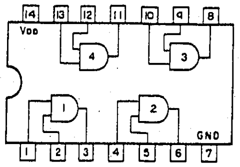
IC735


14 13 12 11 10 9 8
VDD
GND
1 2 3 4 5 6 7

IC721, 723


8 7 6 5
Vcc
VEE
1 2 3 4

IC744, 745, 746
IC747, 748, 750


14 13 12 11 10 9 8
VDD
GND
1 2 3 4 5 6 7

IC743

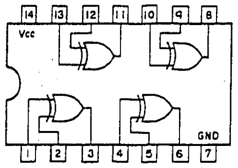
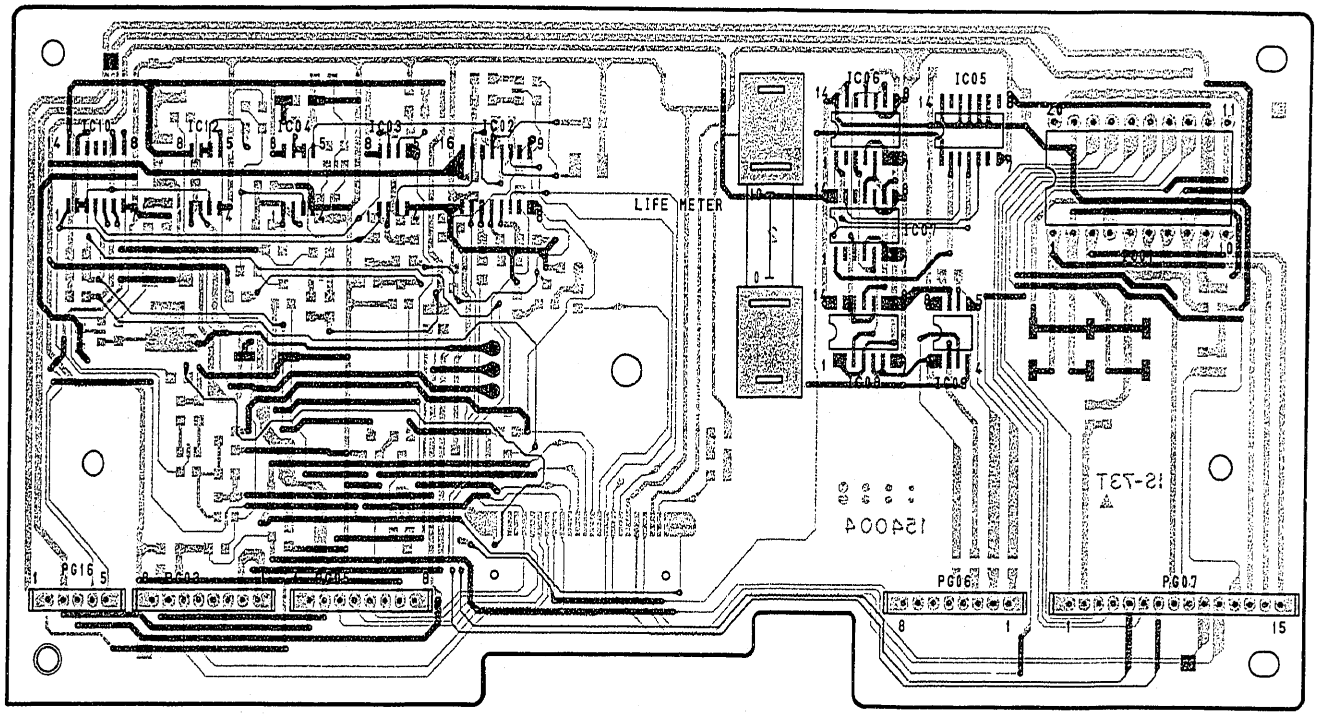

14 13 12 11 10 9 8
Vcc
GND
1 2 3 4 5 6 7

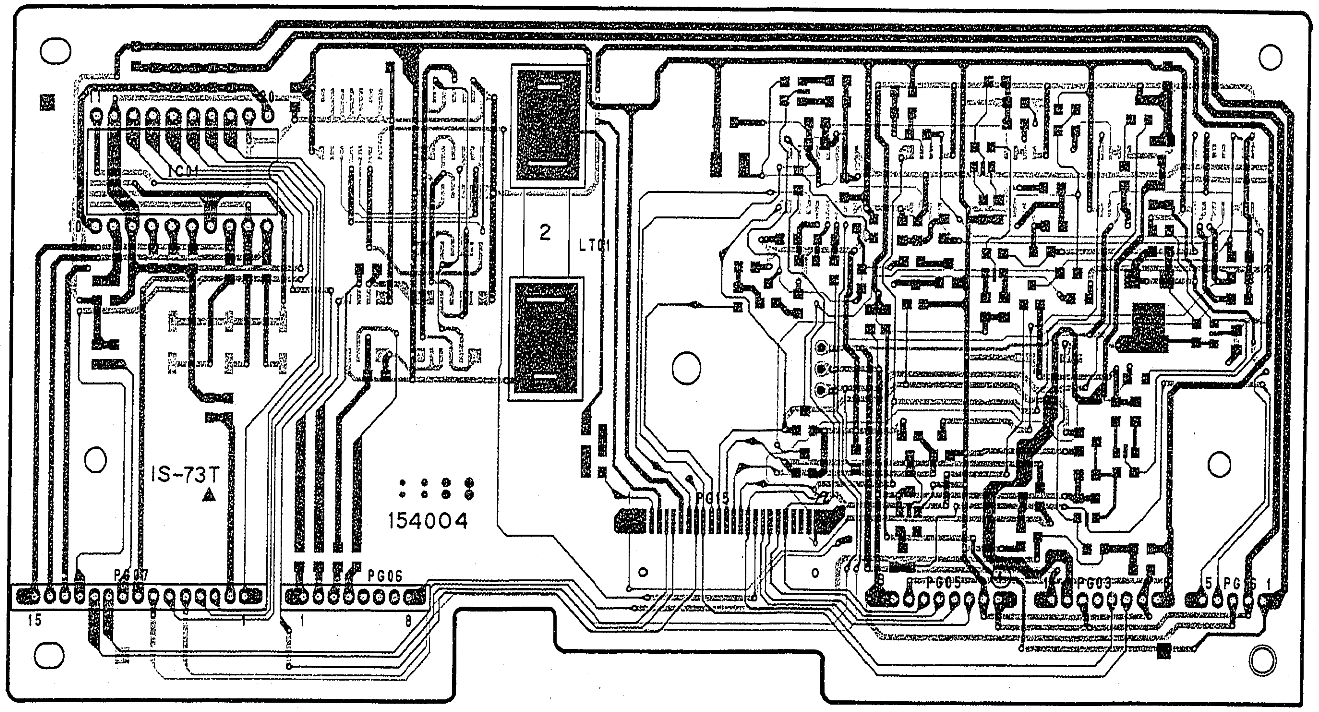
DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO-I	5-33	5-68
AUDIO-II	5-36	5-68
COLOR ENCODER	5-49	5-74
DIG-1/3	5-52	5-76
DIG-2/3	5-55	5-76
DIG-3/3	5-58	5-76
DMD	5-18	5-62
FUNCTION SW	5-9	5-64
IPP	5-32	5-71
JACK	5-30	5-68
PB COLOR PROCESS	5-44	5-74
PB VIDEO	5-46	5-74
PBK	5-12	5-64
PREAMP	5-13	–
REG	5-20	5-66
REG(MAS)	5-31	5-68
REM	5-16	5-67
SC	5-26/31	5-71
SERVO	5-27	5-68
SPF	5-15	5-66
SYSTEM CONTROL-I	5-21	5-68
SYSTEM CONTROL-II	5-24	5-68
T/S	5-23	5-68
VID-1/2	5-39	5-72
VID-1/2	5-42	5-72
WYC	5-25	5-68

DMD CIRCUIT BOARD DIAGRAM

DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO-Ⅰ	5-33	5-68
AUDIO-Ⅱ	5-36	5-68
COLOR ENCODER	5-49	5-74
DIG-1/3	5-52	5-76
DIG-2/3	5-55	5-76
DIG-3/3	5-58	5-76
DMD	5-18	5-62
FUNCTION SW	5-9	5-64
IPP	5-32	5-71
JACK	5-30	5-68
PB COLOR PROCESS	5-44	5-74
PB VIDEO	5-46	5-74
PBK	5-12	5-64
PREAMP	5-13	-
REG	5-20	5-66
REG(MAS)	5-31	5-68
REM	5-18	5-67
SC	5-26/31	5-71
SERVO	5-27	5-68
SPF	5-15	5-66
SYSTEM CONTROL-Ⅰ	5-21	5-68
SYSTEM CONTROL-Ⅱ	5-24	5-68
T/S	5-23	5-68
VID-1/2	5-39	5-72
VID-1/2	5-42	5-72
WYC	5-25	5-68

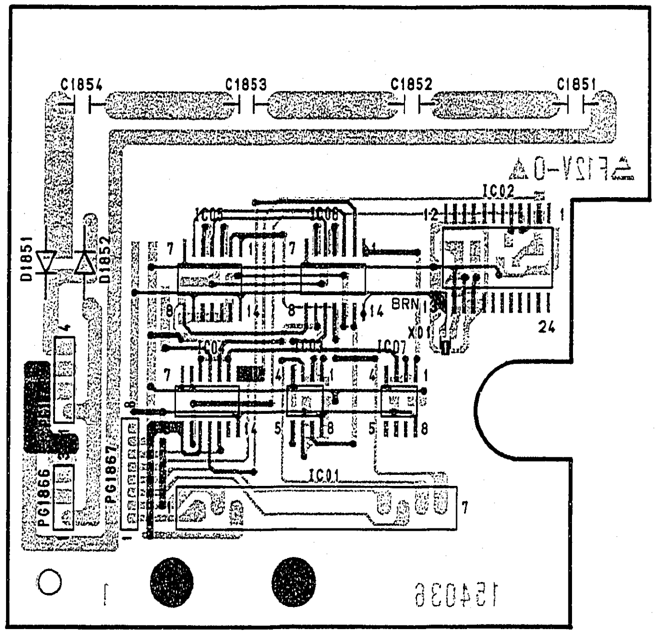

IC10
IC12
IC04
IC03
IC02
IC06
IC05
IC07
IC08
IC09
LIFE METER
IS-73T
154004
PG16
PG03
PG05
PG06
PG07
1
5
8
15
E
D
C
B
A

■:COMPONENTS SIDE ▨:SOLDER SIDE DMD P.C.B—COMPONENTS SIDE—


IC01
2
LT01
IS-73T
154004
PG07
PG06
PG15
PG05
PG03
PG16
15
1
8
5
1
2
3
4
5
6
7

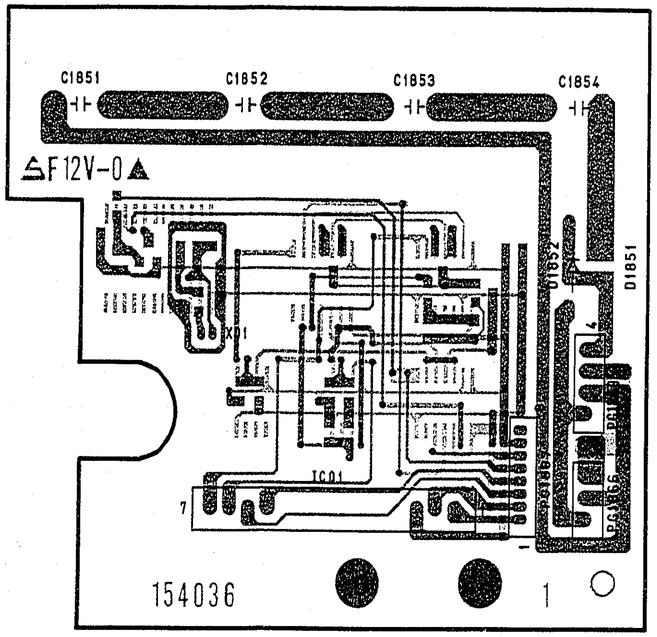
▨:COMPONENTS SIDE ■:SOLDER SIDE DMD P.C.B—SOLDER SIDE—

PBK CIRCUIT BOARD DIAGRAM


C1854
C1853
C1852
C1851
⚠F12V-0⚠
IC02
IC03
IC06
IC04
IC05
IC07
IC01
X01
BRN
D1851
D1852
PG1866
PG1867
154036

▩:COMPONENTS SIDE ▨:SOLDER SIDE

PBK P.C.B
COMPONENTS SIDE—

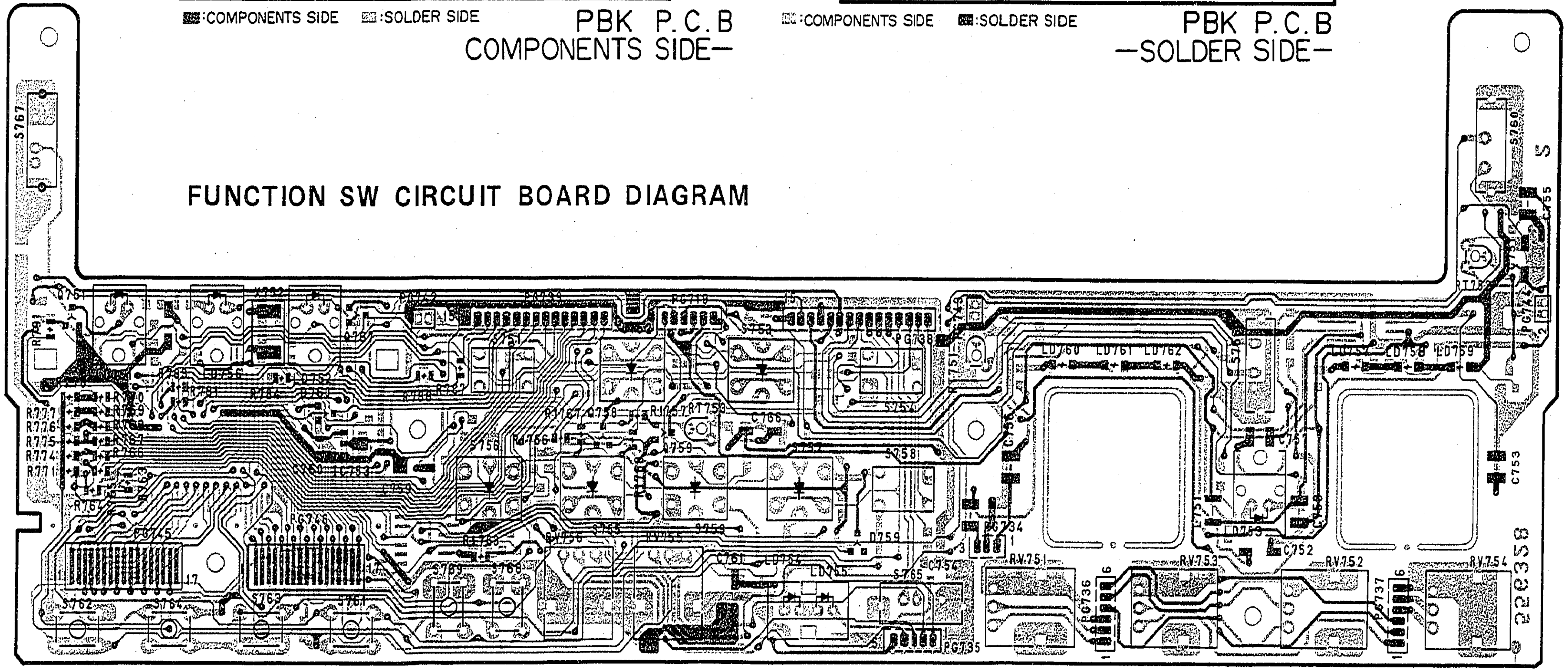

C1851
C1852
C1853
C1854
⚠F12V-0⚠
IC01
X01
D1852
D1851
PG1866
154036

▨:COMPONENTS SIDE ▩:SOLDER SIDE

PBK P.C.B
—SOLDER SIDE—

DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO-Ⅰ	5-33	5-68
AUDIO-Ⅱ	5-36	5-68
COLOR ENCODER	5-49	5-74
DIG-1/3	5-52	5-76
DIG-2/3	5-55	5-76
DIG-3/3	5-58	5-76
DMD	5-18	5-62
FUNCTION SW	5-9	5-64
IPP	5-32	5-71
JACK	5-30	5-68
PB COLOR PROCESS	5-44	5-74
PB VIDEO	5-46	5-74
PBK	5-12	5-64
PREAMP	5-13	-
REG	5-20	5-66
REG(MAS)	5-31	5-68
REM	5-16	5-67
SC	5-28/31	5-71
SERVO	5-27	5-68
SPF	5-15	5-66
SYSTEM CONTROL-Ⅰ	5-21	5-68
SYSTEM CONTROL-Ⅱ	5-24	5-68
T/S	5-23	5-68
VID-1/2	5-39	5-72
VID-1/2	5-42	5-72
WYC	5-25	5-68

FUNCTION SW CIRCUIT BOARD DIAGRAM


S767
S760
S
C755
C753
LD760
LD761
LD762
LD758
LD759
LD763
PG738
PG718
S753
S757
S758
S756
S751
S752
S755
S759
D759
C766
C761
C752
C754
LD755
RV751
RV753
RV752
RV754
PG736
PG737
PG735
PG734
PG745
S762
S764
S763
S761
S769
S768
S765
R777
R776
R775
R774
R771
R764
222358

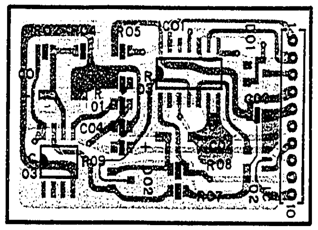
▩:COMPONENTS SIDE ▨:SOLDER SIDE

FUNCTION SW P.C.B
—COMPONENTS SIDE—

E
D
C
B
A

1 2 3 4 5 6 7 8

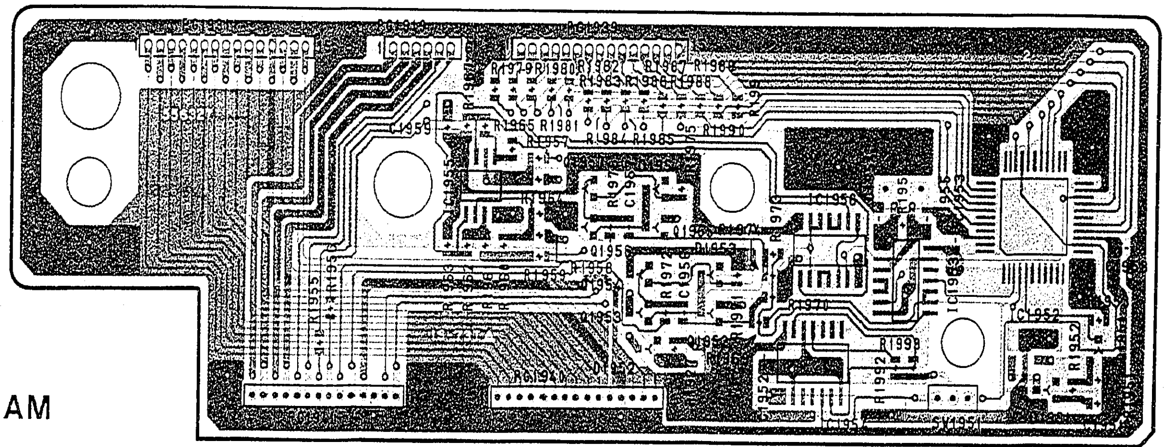
SPF CIRCUIT BOARD DIAGRAM


R05
C01
C04
Q1
Q3
R08
R07
Q2

SPF P.C.B

▒ :COMPONENT SIDE
▩ :SOLDER SIDE

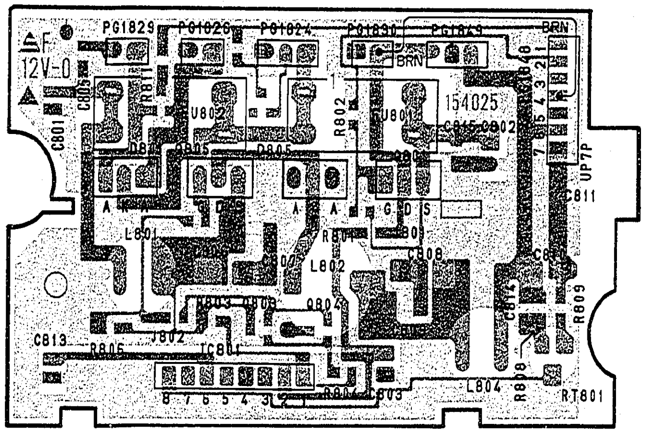
REM CIRCUIT BOARD DIAGRAM


IC1951
IC1952
IC1953
IC1956
Q1951
Q1952
R1980
R1981
R1983
R1984
R1985
R1990
R1991
R1992
R1993
R1994
R1995
R1996
R1970
R1975
SW1951

▒ :COMPONENTS SIDE ▩ :SOLDER SIDE

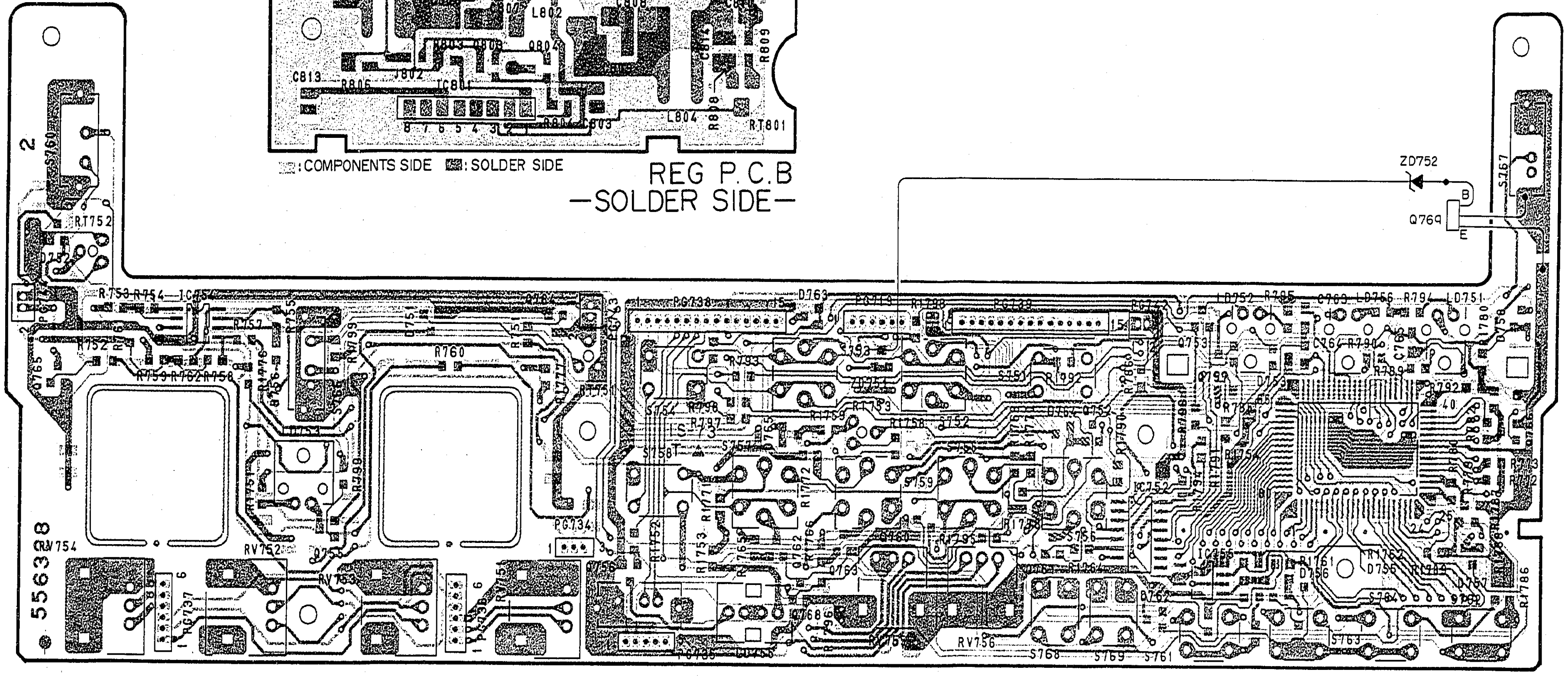
REM P.C.B —SOLDER SIDE—

REG CIRCUIT BOARD DIAGRAM


PG1829
PG1826
PG1824
PG1830
PG1843
BRN
F
12V-0
154025
U801
U802
C801
C805
C811
C813
C815
C802
D803
D805
L801
L802
L804
R802
R806
R809
R801
Q801
Q802
IC801
RT801
UP7P
8 7 6 5 4 3 2 1

▒ :COMPONENTS SIDE ▩ :SOLDER SIDE

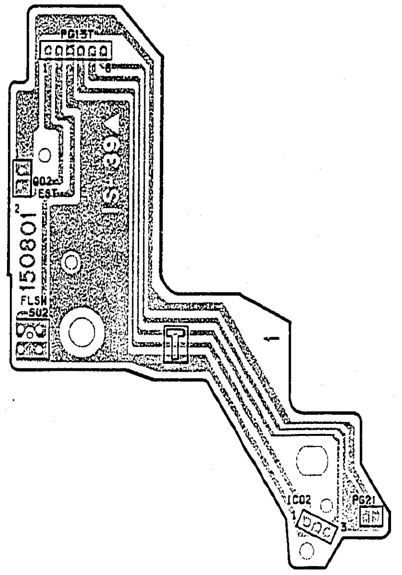
REG P.C.B
—SOLDER SIDE—


S760
RT752
R753
R754
IC752
R752
D765
R759
R762
R758
R760
R757
R755
D751
R799
S767
ZD752
Q769
B
E
PG738
PG739
D763
R798
LD752
R785
LD756
R794
LD751
R780
Q753
R790
R789
R792
IC753
S751
S752
S753
S754
S755
S756
S757
S758
S759
S761
S762
S763
S764
S765
S766
S768
S769
R1758
R1759
R1760
R1761
R1762
R1763
R1771
R1772
R1773
IC752
IC756
D756
R786
RV752
RV753
RV754
RV756
PG737
PG736
PG734
556398

▒ :COMPONENTS SIDE ▩ :SOLDER SIDE

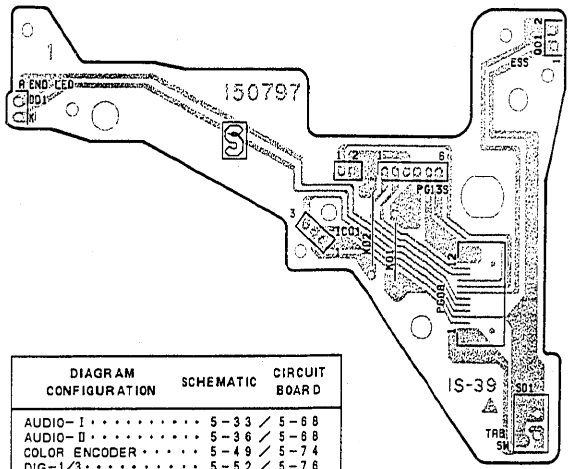
FUNCTION SW P.C.B
—SOLDER SIDE—

T CIRCUIT BOARD DIAGRAM


PG15T
Q02
ESS
IS-39
150801
FLSH
SU2
T
IC02
PG21

T P.C.B

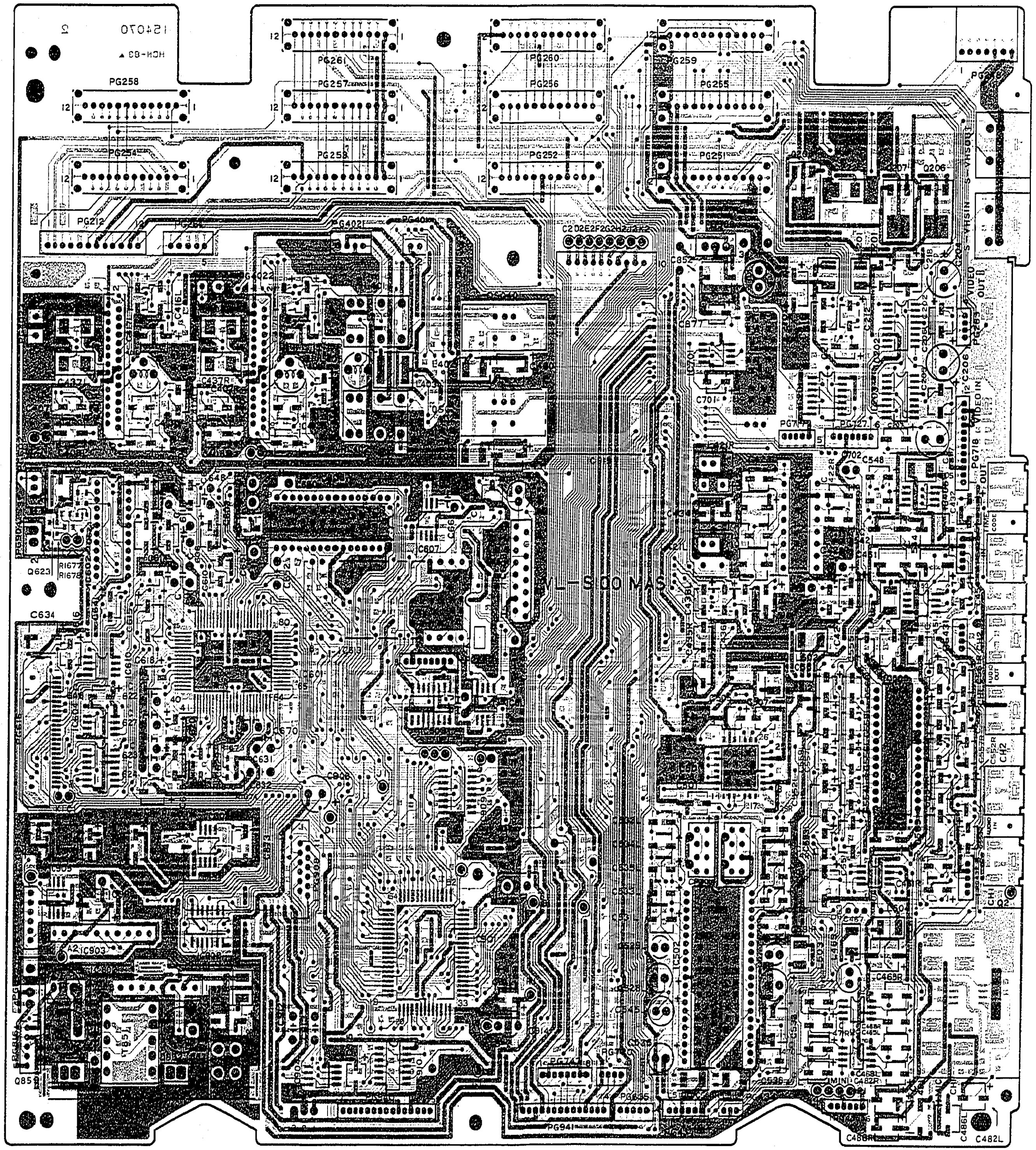
S CIRCUIT BOARD DIAGRAM


1
150797
END-LED
D01
S
ESS
D01
PG13S
IC01
IS-39
S01
TAB SW

S P.C.B

DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO-I	5-33	5-68
AUDIO-II	5-36	5-68
COLOR ENCODER	5-49	5-74
DIG-1/3	5-52	5-76
DIG-2/3	5-55	5-76
DIG-3/3	5-58	5-76
DMD	5-18	5-62
FUNCTION SW	5-9	5-64
IPP	5-32	5-71
JACK	5-30	5-68
PB COLOR PROCESS	5-44	5-74
PB VIDEO	5-46	5-74
PBK	5-12	5-64
PREAMP	5-13	-
REG	5-20	5-66
REG(MAS)	5-31	5-68
REM	5-16	5-67
SC	5-26/31	5-71
SERVO	5-27	5-60
SPF	5-15	5-66
SYSTEM CONTROL-I	5-21	5-68
SYSTEM CONTROL-II	5-24	5-68
T/S	5-23	5-68
VID-1/2	5-39	5-72
VID-1/2	5-42	5-72
WYC	5-25	5-68

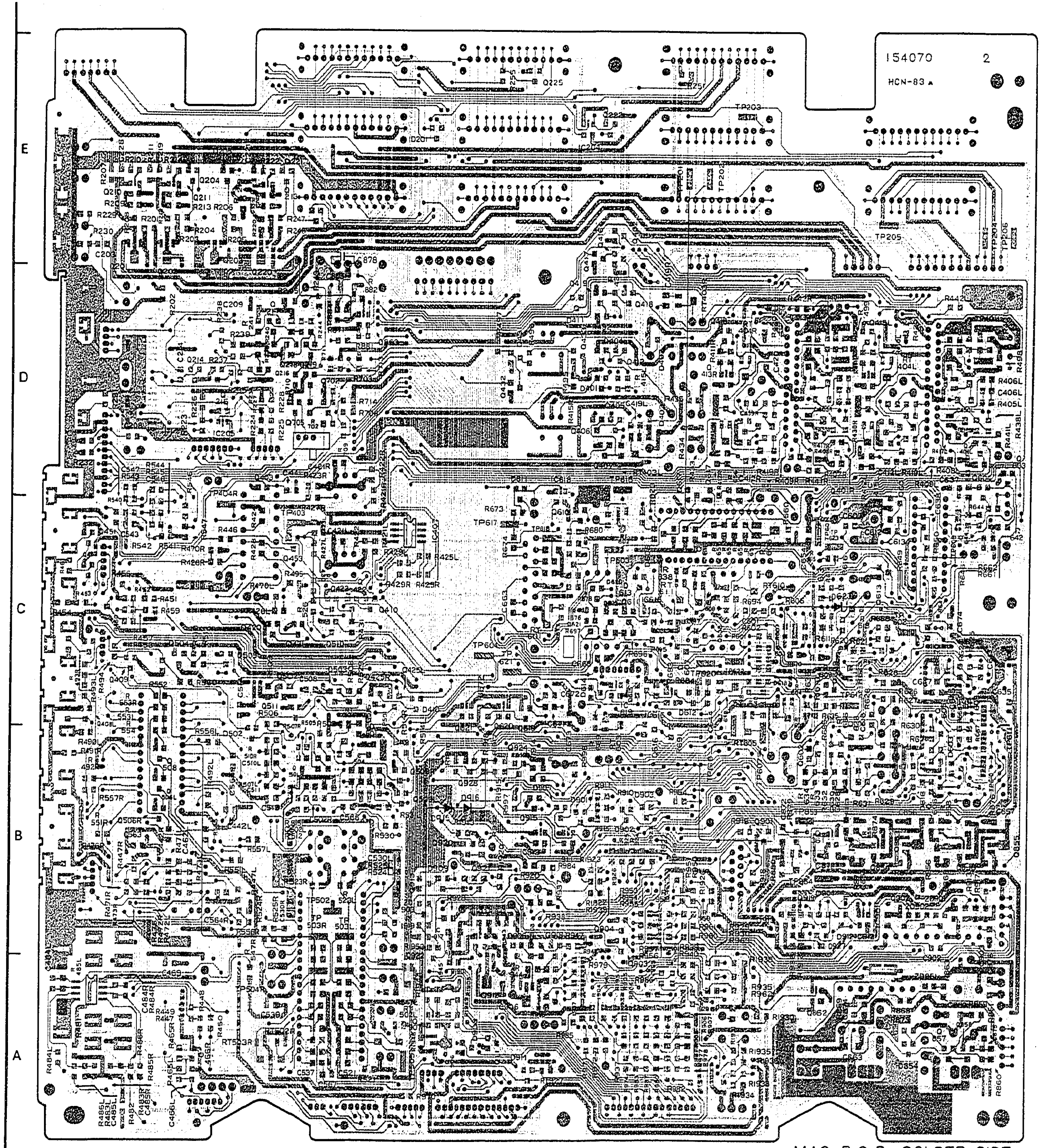
MAS CIRCUIT BOARD DIAGRAM


154070
HCH-63
PG258
PG261
PG257
PG260
PG256
PG259
PG255
PG254
PG253
PG252
PG251
PG212
PG402
Q206
C634
Q623
Q851
VL-S00 MAS
VIDEO OUT
VIDEO IN
CH1
CH2
C482L
C486L
PG941

■:COMPONENTS SIDE ▨:SOLDER SIDE

MAS P.C.B—COMPONENTS SIDE—

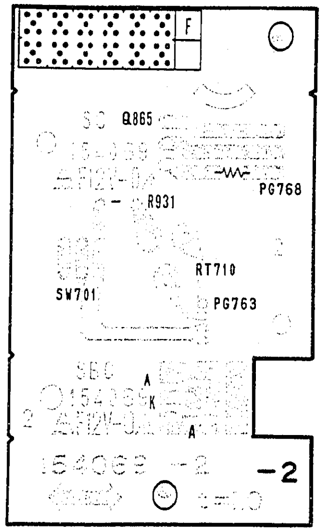
MAS CIRCUIT BOARD DIAGRAM


154070 2
HCN-83
E
D
C
B
A
1
2
3
4
5
6
7

:COMPONENTS SIDE ▨ :SOLDER SIDE

MAS P.C.B—SOLDER SIDE—

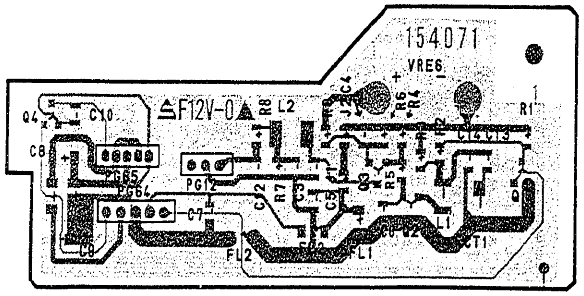
SC CIRCUIT BOARD DIAGRAM


F
SC Q865
R931
PG768
RT710
SW701
PG763
154069 -2
-2

SC P.C.B

DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO-Ⅰ	5-33	5-68
AUDIO-Ⅱ	5-36	5-68
COLOR ENCODER	5-49	5-74
DIG-1/3	5-52	5-76
DIG-2/3	5-55	5-76
DIG-3/3	5-58	5-76
DMD	5-18	5-62
FUNCTION SW	5-9	5-64
IPP	5-32	5-71
JACK	5-30	5-68
PB COLOR PROCESS	5-44	5-74
PB VIDEO	5-46	5-74
PBK	5-12	5-64
PREAMP	5-13	-
REG	5-20	5-66
REG(MAS)	5-31	5-68
REM	5-16	5-67
SC	5-26/31	5-71
SERVO	5-27	5-66
SPF	5-15	5-66
SYSTEM CONTROL-Ⅰ	5-21	5-68
SYSTEM CONTROL-Ⅱ	5-24	5-68
T/S	5-23	5-68
VID-1/2	5-39	5-72
VID-1/2	5-42	5-72
WYC	5-25	5-68

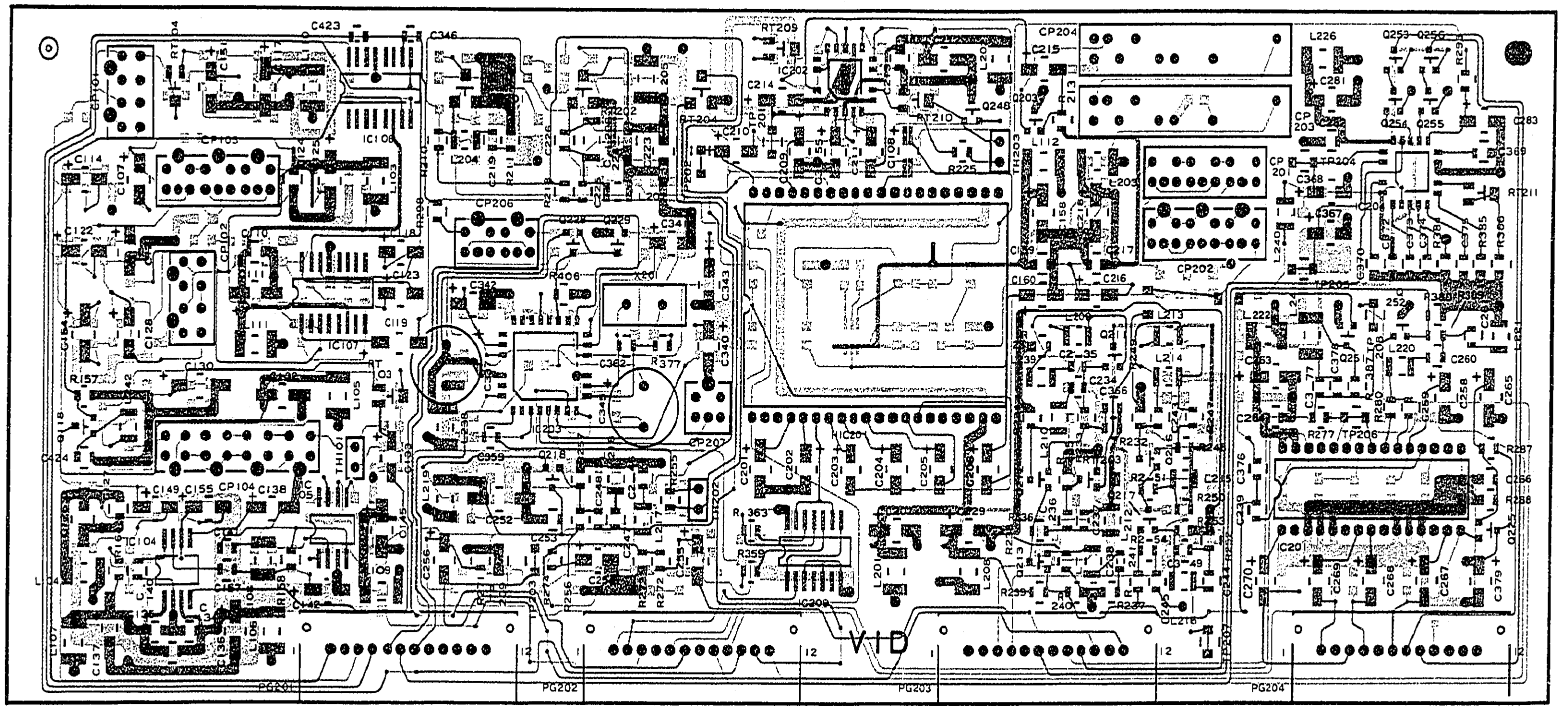
IPP CIRCUIT BOARD DIAGRAM


154071
VRE6
F12V-0
Q4
C10
C8
L2
PG12
C7
C6
FL2
FL1
L1
T1
R1

:COMPONENTS SIDE
▨ :SOLDER SIDE

IPP P.C.B

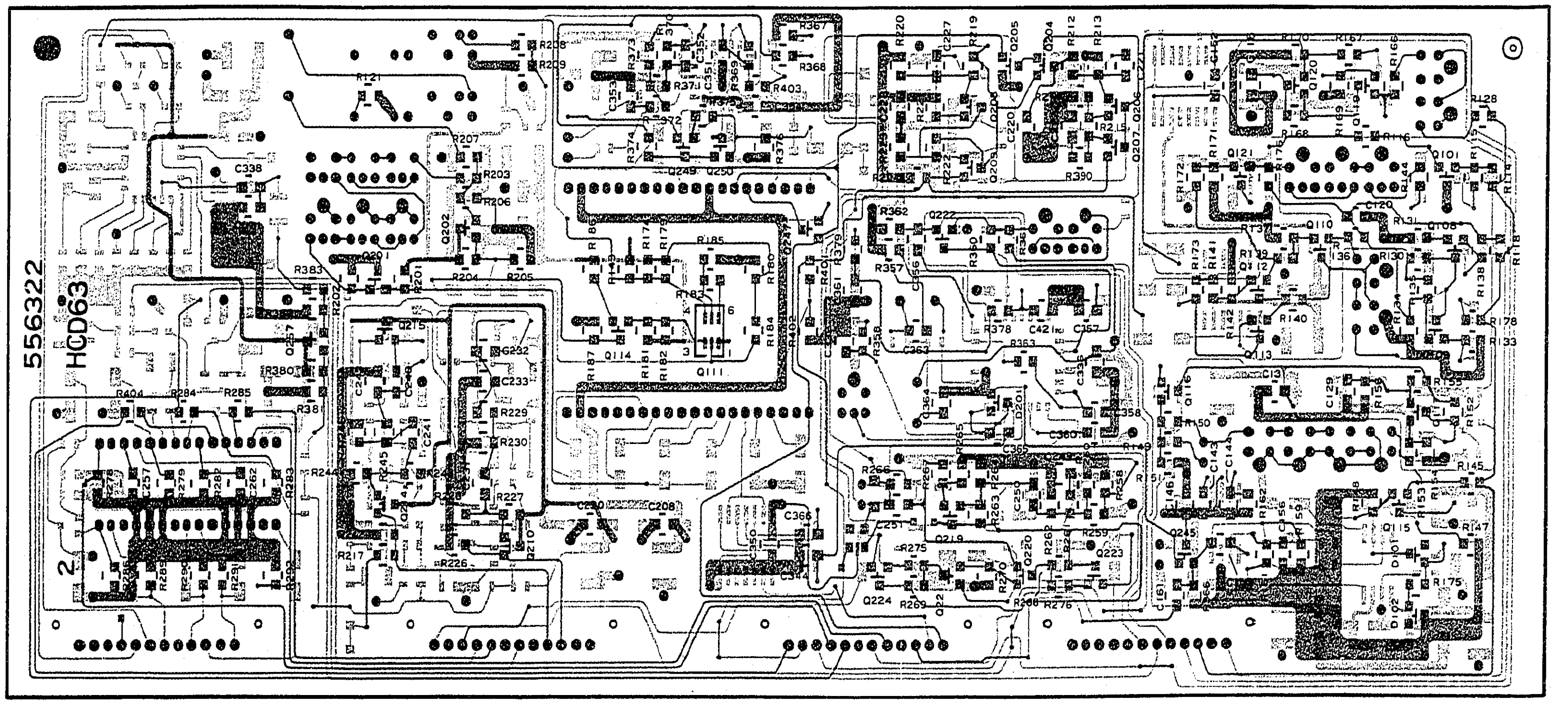
VID CIRCUIT BOARD DIAGRAM


E
D
C
IC106
IC107
IC104
IC201
IC202
IC203
CP103
CP104
CP201
CP202
CP203
CP204
CP206
CP207
L226
Q253
Q256
Q254
Q255
Q248
RT209
RT210
RT211
TP204
TP206
VID
PG201
PG202
PG203
PG204

▩:COMPONENTS SIDE ▨:SOLDER SIDE

VID P.C.B—COMPONENTS SIDE—

DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO—I	5—33 /	5—68
AUDIO—II	5—36 /	5—68
COLOR ENCODER	5—49 /	5—74
DIG—1/3	5—52 /	5—76
DIG—2/3	5—55 /	5—76
DIG—3/3	5—58 /	5—76
DMD	5—18 /	5—62
FUNCTION SW	5—9 /	5—64
IPP	5—32 /	5—71
JACK	5—30 /	5—68
PB COLOR PROCESS	5—44 /	5—74
PB VIDEO	5—46 /	5—74
PBK	5—12 /	5—64
PREAMP	5—13 /	—
REG	5—20 /	5—66
REG(MAS)	5—31 /	5—68
REM	5—16 /	5—67
SC	5—26/31/	5—71
SERVO	5—27 /	5—68
SPF	5—15 /	5—66
SYSTEM CONTROL—I	5—21 /	5—68
SYSTEM CONTROL—II	5—24 /	5—68
T/S	5—23 /	5—68
VID—1/2	5—39 /	5—72
VID—1/2	5—42 /	5—72
WYC	5—25 /	5—68

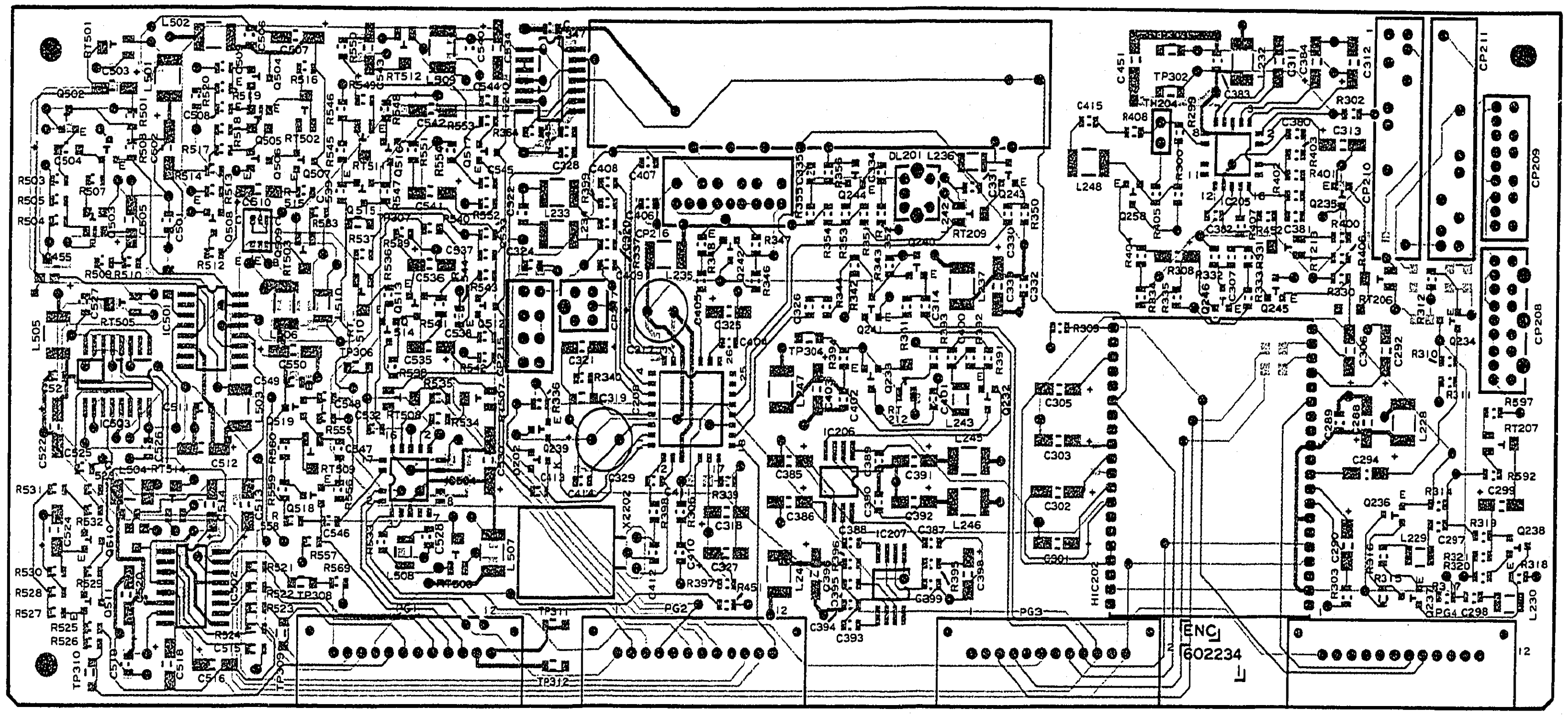

B
A
1
2
3
4
5
6
7
556322
HCD63
2
Q111
Q114
Q110
Q101
Q115
Q219
Q220
Q222
Q223
Q224
Q249
Q250
C338
C366
R380
R383
R404
R226
R227
R229
R230
R390
R403

VID基板は4層構造のプリント基板ですが、第2層
および第3層パターンは掲載されていません。
The VID circuit board has four layers,
however, the patterns of the second and
third layers are not shown.

▨:COMPONENTS SIDE ▩:SOLDER SIDE

VID P.C.B—SOLDER SIDE—

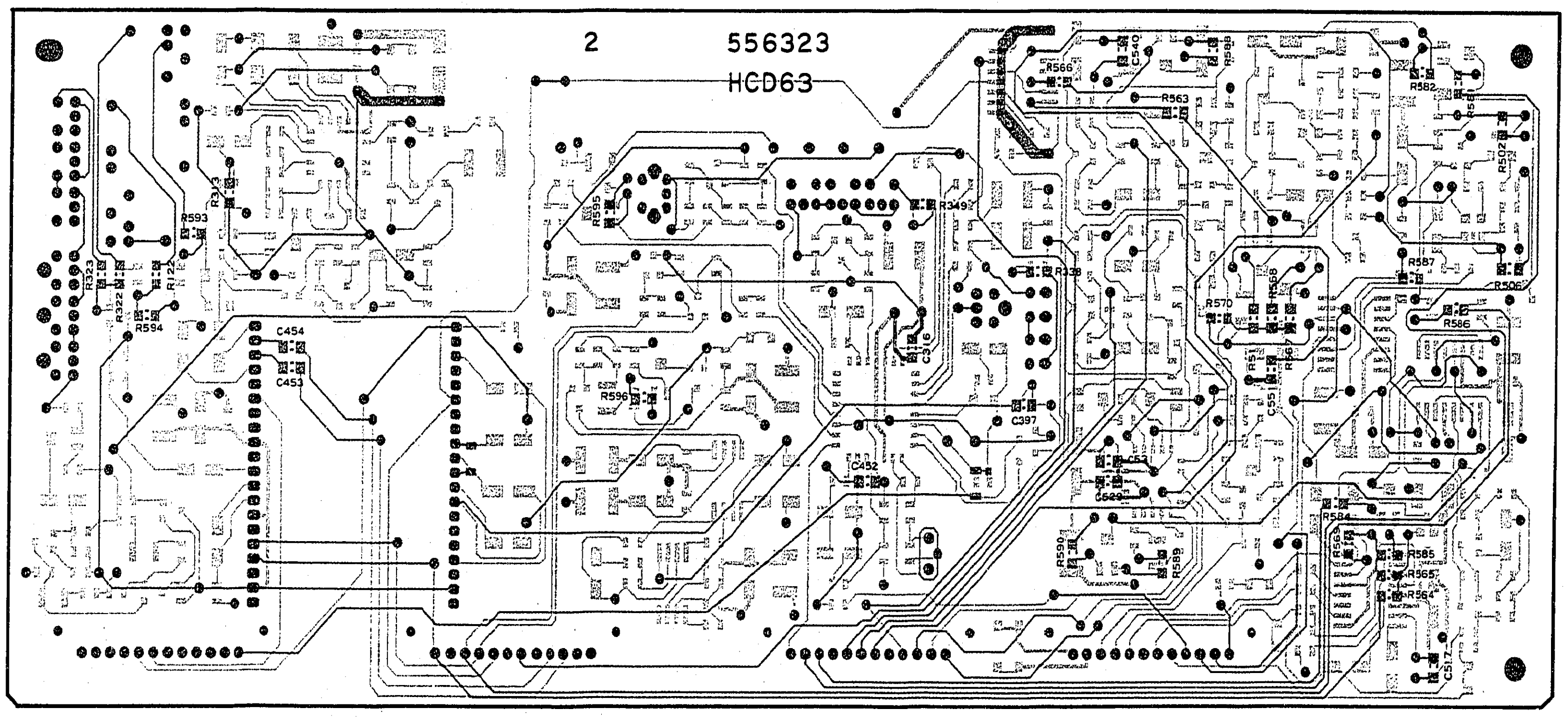
ENC CIRCUIT BOARD DIAGRAM



▨ :COMPONENTS SIDE ▨ :SOLDER SIDE

ENC P.C.B—COMPONENTS SIDE—

DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO-Ⅰ	5-33	5-68
AUDIO-Ⅱ	5-38	5-68
COLOR ENCODER	5-49	5-74
DIG-1/3	5-52	5-76
DIG-2/3	5-55	5-76
DIG-3/3	5-58	5-76
DMD	5-18	5-62
FUNCTION SW	5-9	5-64
IPP	5-32	5-71
JACK	5-30	5-68
PB COLOR PROCESS	5-44	5-74
PB VIDEO	5-46	5-74
PBK	5-12	5-64
PREAMP	5-13	-
REG	5-20	5-66
REG(MAS)	5-31	5-68
REM	5-16	5-67
SC	5-28/31	5-71
SERVO	5-27	5-68
SPF	5-15	5-66
SYSTEM CONTROL-Ⅰ	5-21	5-68
SYSTEM CONTROL-Ⅱ	5-24	5-68
T/S	5-23	5-68
VID-1/2	5-39	5-72
VID-1/2	5-42	5-72
WYC	5-25	5-68



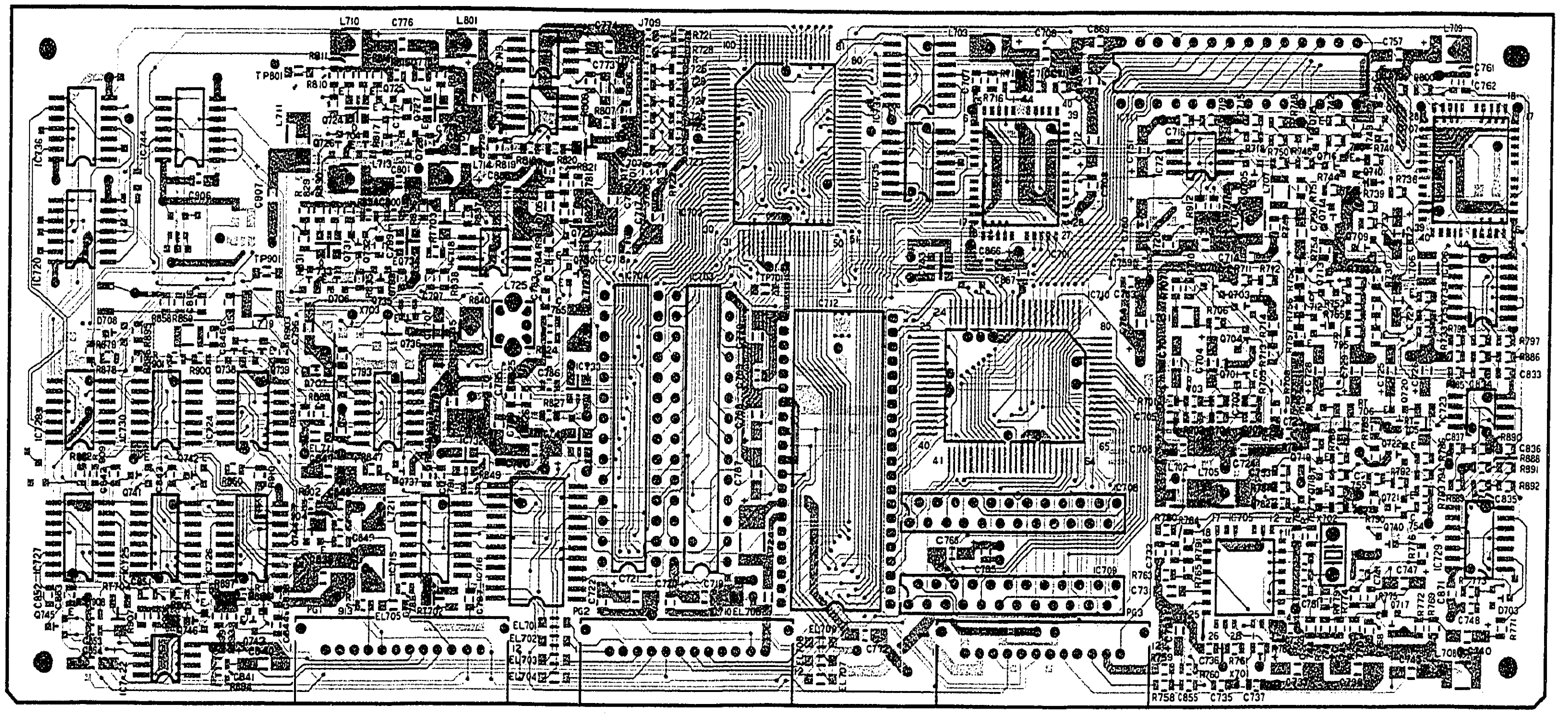
▨ :COMPONENTS SIDE ▨ :SOLDER SIDE

ENC P.C.B—SOLDER SIDE—

ENC基板は4層構造のプリント基板ですが、第2層および第3層パターンは掲載されていません。

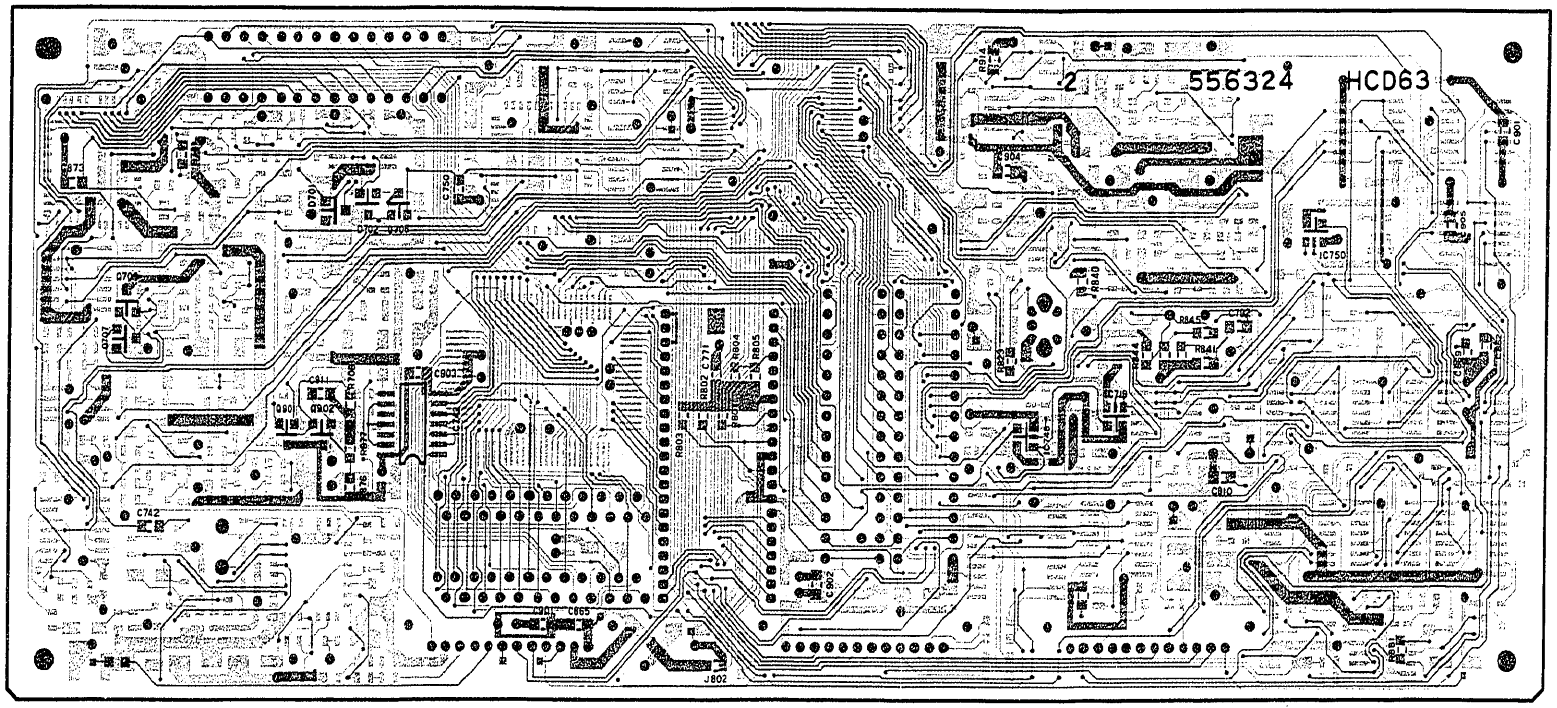
The ENC circuit board has four layers, however, the patterns of the second and third layers are not shown.

DIG CIRCUIT BOARD DIAGRAM


E
D
TP801
TP901
L710
C776
L801
J709
L703
C757
L709
IC709
PG1
PG2
PG3
EL705
EL706
R797
C833
R892

▨:COMPONENTS SIDE ▨:SOLDER SIDE

DIG P.C.B —COMPONENTS SIDE—


C
B
A
2
556324
HCD63
IC750
C901
C742
C902
J802
R840

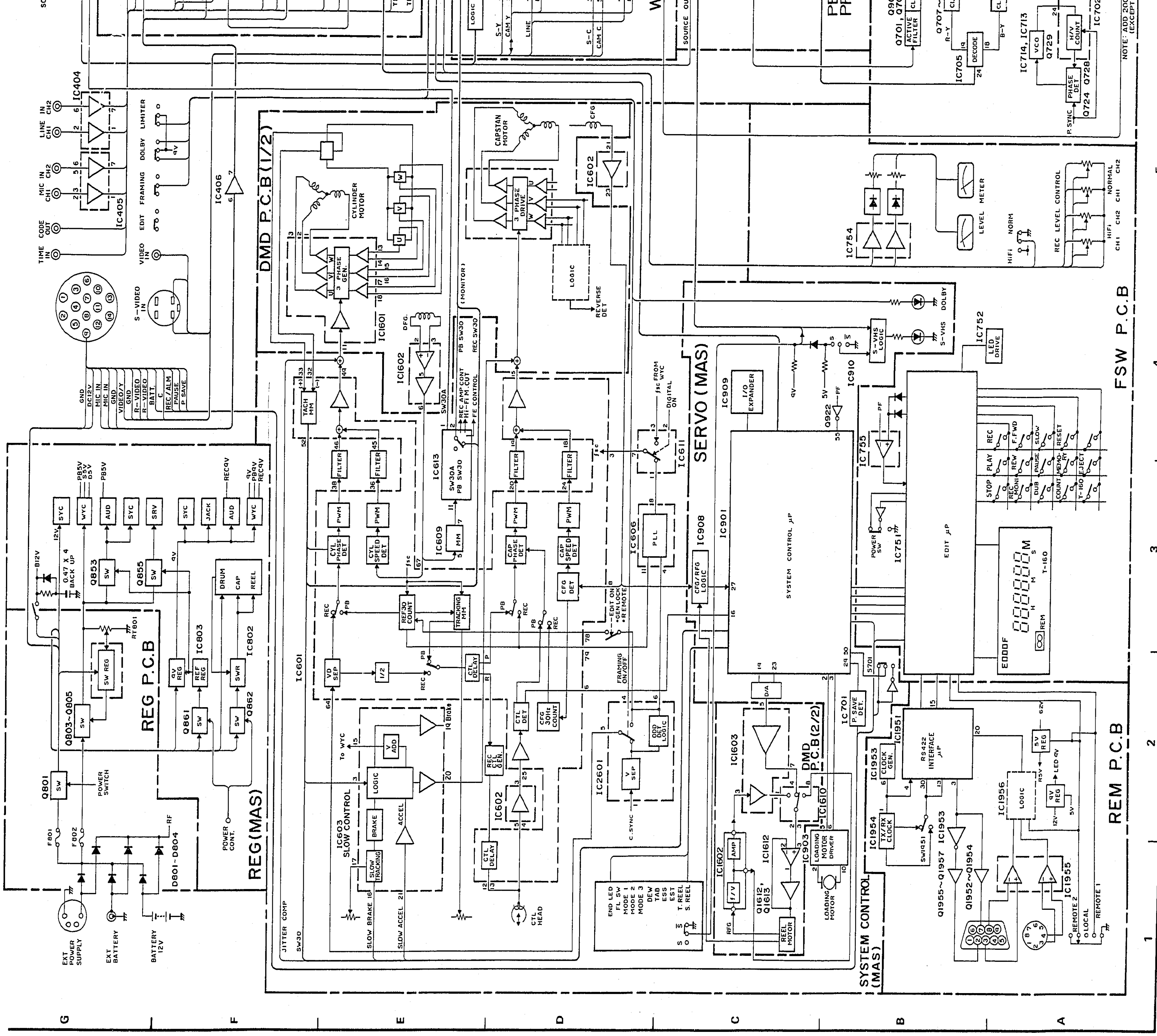
▨:SOLDER SIDE ▨:COMPONENTS SIDE DIG P.C.B —SOLDER SIDE—

DIAGRAM CONFIGURATION	SCHEMATIC	CIRCUIT BOARD
AUDIO-I	5-33	5-68
AUDIO-II	5-36	5-68
COLOR ENCODER	5-49	5-74
DIG-1/3	5-52	5-76
DIG-2/3	5-55	5-76
DIG-3/3	5-58	5-76
DMD	5-18	5-62
FUNCTION SW	5-9	5-64
IPP	5-32	5-71
JACK	5-30	5-68
PB COLOR PROCESS	5-44	5-74
PB VIDEO	5-46	5-74
PBK	5-12	5-64
PREAMP	5-13	-
REG	5-20	5-66
REG(MAS)	5-31	5-68
REM	5-16	5-67
SC	5-26/31	5-71
SERVO	5-27	5-68
SPF	5-15	5-66
SYSTEM CONTROL-I	5-21	5-68
SYSTEM CONTROL-II	5-24	5-68
T/S	5-23	5-68
VID-1/2	5-39	5-72
VID-1/2	5-42	5-72
WYC	5-25	5-68

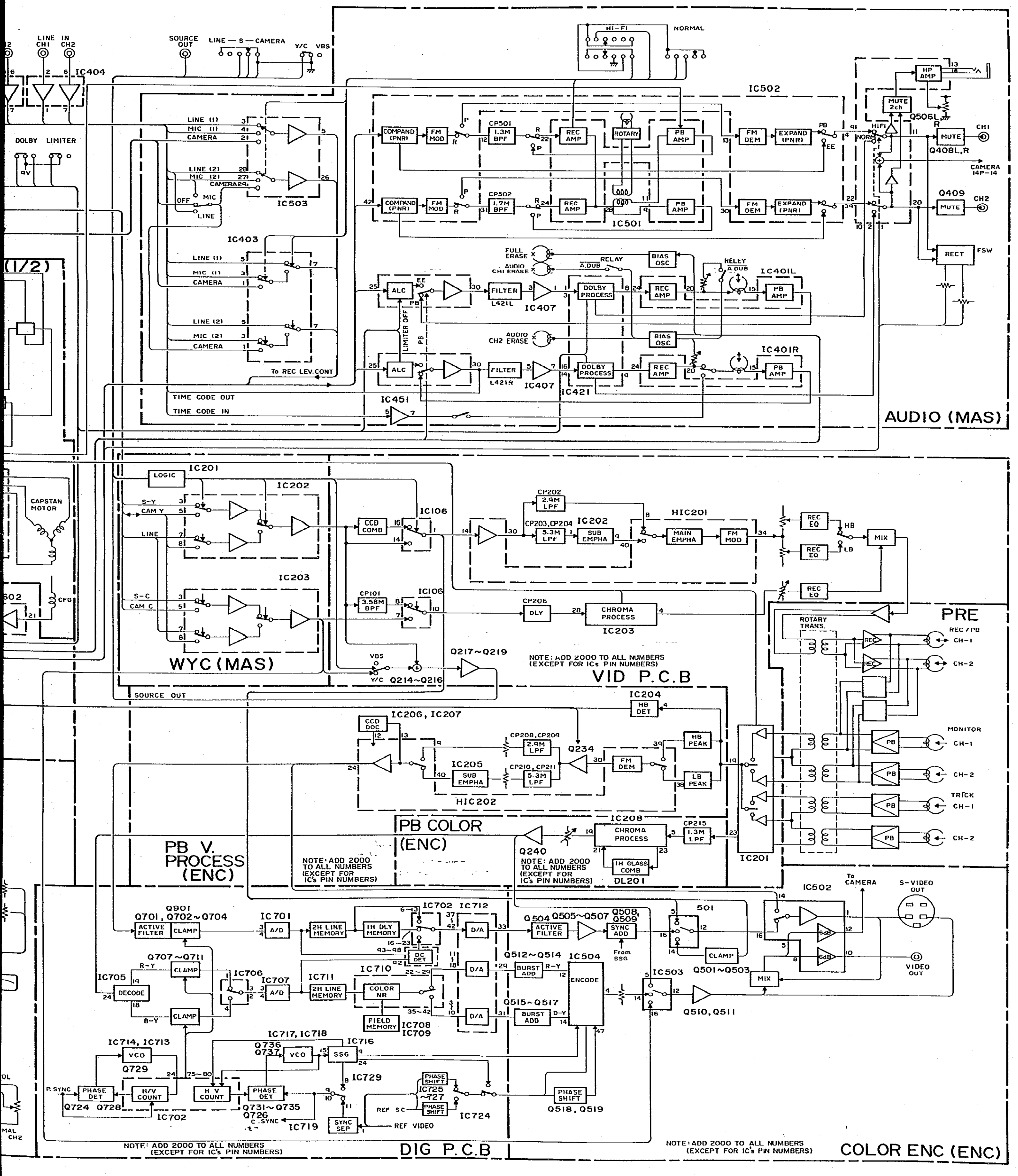
DIG基板は4層構造のプリント基板ですが、第2層および第3層パターンは掲載されていません。
The DIG circuit board has four layers, however, the patterns of the second and third layers are not shown.

1 2 3 4 5 6 7

OVERALL BLOCK DIAGRAM


REG P.C.B
REG(MAS)
DMD P.C.B(1/2)
DMD P.C.B(2/2)
SERVO (MAS)
SYSTEM CONTROL (MAS)
FSW P.C.B
REM P.C.B
EXT POWER SUPPLY
EXT BATTERY
BATTERY 12V
F801
F802
D801~D804
RF
Q801
POWER SWITCH
POWER CONT.
Q803~Q805
SW REG
RT801
Q853
Q855
Q861
Q862
IC803
IC802
9V REG
REF REG
SWR
B12V
0.47 X 4 BACK UP
SYC
WYC
AUD
SRV
JACK
PB5V
S5V
D5V
REC9V
DRUM
CAP
REEL
GND
DC12V
MIC IN
VIDEO/Y
R-VIDEO
BATT.
REC/ALM
PAUSE
P SAVE
S-VIDEO IN
VIDEO IN
TIME CODE IN
TIME CODE OUT
MIC IN CH1 CH2
LINE IN CH1 CH2
IC404
IC405
IC406
EDIT
FRAMING
DOLBY
LIMITER
CYLINDER MOTOR
CAPSTAN MOTOR
3 PHASE GEN.
3 PHASE DRIVE
IC1601
IC1602
DFG
IC602
CFG
LOGIC
REVERSE DET
TACH MM
FILTER
PWM
CYL PHASE DET
CYL SPEED DET
CAP PHASE DET
CAP SPEED DET
IC601
IC609
MM
IC613
SW30A PB SW30
REC AMP CONT
HI-FI M.CUT
FE CONTROL
PB SW30
REC SW30
(MONITOR)
IC606
PLL
IC611
fsc FROM WYC
DIGITAL ON
REF30 COUNT
TRACKING MM
CFG DET
VD SEP
1/2
CTL DELAY
CTL DET
CFG 30Hz COUNT
REC GEN.
IC603 SLOW CONTROL
SLOW TRACKING
BRAKE
ACCEL
V ADD
To WYC
SLOW BRAKE
SLOW ACCEL
JITTER COMP
SW30
CTL HEAD
FRAMING ON/OFF
EDIT ON
GENLOCK
REMOTE
IC2601
V SEP
ODD DET LOGIC
C.SYNC
IC908
CFG/RFG LOGIC
IC901
SYSTEM CONTROL µP
IC909
I/O EXPANDER
Q922
PF
IC910
IC1603
IC1610
IC1612
Q1612, Q1613
IC903
LOADING MOTOR DRIVER
LOADING MOTOR
REEL MOTOR
AMP
f/V
RFG
D/A
END LED
FL SW
MODE 1
MODE 2
MODE 3
DEW
TAB
ESS
EST
T.REEL
S.REEL
IC701
P.SAVE DET.
S701
IC752
LED DRIVE
S-VHS LOGIC
S-VHS
DOLBY
IC754
LEVEL METER
REC LEVEL CONTROL
HiFi
NORM
NORMAL
CH1
CH2
IC755
IC751
POWER SW
EDIT µP
STOP
PLAY
REC
REW
F.FWD
SLOW
RESET
REC MONI
DUB
PAUSE
COUNT
MEMORY
EJECT
T-160
REM
EDDDF
IC1951
IC1953
CLOCK GEN.
RS422 INTERFACE µP
IC1954
TX/RX CLOCK
SW1951
IC1956
LOGIC
5V REG
9V REG
LED 9V
Q1955~Q1957
Q1952~Q1954
IC1955
REMOTE 2
LOCAL
REMOTE 1
Q701
ACTIVE FILTER
Q707
IC705
DECODE
R-Y
B-Y
IC714, IC713
VCO
Q729
H/V COUNT
IC702
PHASE DET
Q724
Q728
P.SYNC
SOURCE OUT
NOTE: ADD 200
(EXCEPT
1
2
3
4
5
A
B
C
D
E
F
G

5-78 5-79 OVERALL BLOCK DIAGRAM


AUDIO (MAS)
IC502
IC501
IC503
IC403
IC404
IC451
IC407
IC421
IC401L
IC401R
LINE IN CH1 CH2
SOURCE OUT
LINE — S — CAMERA
Y/C VBS
DOLBY LIMITER
HI-FI
NORMAL
LINE (1)
MIC (1)
CAMERA
LINE (2)
MIC (2)
OFF MIC LINE
To REC LEV.CONT
TIME CODE OUT
TIME CODE IN
COMPAND (PNR)
FM MOD
CP501 1.3M BPF
CP502 1.7M BPF
REC AMP
ROTARY
PB AMP
FM DEM
EXPAND (PNR)
PB EE
HiFi NORM
MUTE 2ch
HP AMP
Q506L,R
MUTE
Q408L,R
CH1
CAMERA 14P-14
Q409
CH2
RECT
FSW
FULL ERASE
AUDIO CH1 ERASE
AUDIO CH2 ERASE
RELAY A.DUB
RELEY A.DUB
BIAS OSC
ALC
LIMITER OFF
FILTER
L421L
L421R
DOLBY PROCESS
(1/2)
CAPSTAN MOTOR
CFG
602
WYC (MAS)
IC201
LOGIC
IC202
IC203
S-Y
CAM Y
LINE
S-C
CAM C
SOURCE OUT
IC106
CCD COMB
CP101 3.58M BPF
VBS
Y/C
Q214~Q216
Q217~Q219
CP202 2.9M LPF
CP203,CP204 5.3M LPF
SUB EMPHA
HIC201
MAIN EMPHA
FM MOD
REC EQ
HB
LB
MIX
CP206 DLY
CHROMA PROCESS
IC203
NOTE: ADD 2000 TO ALL NUMBERS (EXCEPT FOR ICs PIN NUMBERS)
VID P.C.B
PRE
ROTARY TRANS.
REC/PB CH-1
CH-2
REC
MONITOR CH-1
CH-2
TRICK CH-1
CH-2
PB
IC201
IC204 HB DET
IC206, IC207
CCD DOC
CP208,CP209 2.9M LPF
CP210,CP211 5.3M LPF
IC205 SUB EMPHA
HIC202
Q234
FM DEM
HB PEAK
LB PEAK
PB COLOR (ENC)
IC208
CHROMA PROCESS
CP215 1.3M LPF
1H GLASS COMB
DL201
Q240
NOTE: ADD 2000 TO ALL NUMBERS (EXCEPT FOR ICs PIN NUMBERS)
PB V. PROCESS (ENC)
NOTE: ADD 2000 TO ALL NUMBERS (EXCEPT FOR ICs PIN NUMBERS)
Q901
Q701, Q702~Q704
ACTIVE FILTER
CLAMP
IC701 A/D
2H LINE MEMORY
1H DLY MEMORY
IC702 IC712
DC DET
D/A
Q707~Q711
R-Y
B-Y
IC705 DECODE
IC706
IC707 A/D
IC711 2H LINE MEMORY
IC710 COLOR NR
FIELD MEMORY
IC708 IC709
IC714, IC713
VCO
Q729
IC717, IC718
Q736 Q737
IC716 SSG
P.SYNC
PHASE DET
H/V COUNT
Q724 Q728
IC702
H V COUNT
Q731~Q735
Q726
C.SYNC
IC719
SYNC SEP
IC729
PHASE SHIFT
IC725 ~727
IC724
REF SC
REF VIDEO
NOTE: ADD 2000 TO ALL NUMBERS (EXCEPT FOR ICs PIN NUMBERS)
DIG P.C.B
Q504 Q505~Q507
Q508, Q509
SYNC ADD
From SSG
Q512~Q514
BURST ADD
IC504 ENCODE
Q515~Q517
D-Y
Q518, Q519
501
CLAMP
Q501~Q503
IC503
Q510, Q511
IC502
6dB
MIX
To CAMERA
S-VIDEO OUT
VIDEO OUT
NOTE: ADD 2000 TO ALL NUMBERS (EXCEPT FOR ICs PIN NUMBERS)
COLOR ENC (ENC)
5
6
7
8
9
10

CHAPTER 6

ELECTRICAL PARTS LIST (VL-S100)

SYMBOL–NO	P–NO	DESCRIPTION
		CAPACITORS
C 201	0206509	ELECTROLYTIC 10UF 16V
C 202	0206517	ELECTROLYTIC 47UF 6.3V
C 203	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 204	0256781	ELECTROLYTIC 470UF 6.3V
C 205	0206517	ELECTROLYTIC 47UF 6.3V
C 206	0256781	ELECTROLYTIC 470UF 6.3V
C 207	0206517	ELECTROLYTIC 47UF 6.3V
C 208	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 209	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 210	0206517	ELECTROLYTIC 47UF 6.3V
C 211	0206511	ELECTROLYTIC 22UF 6.3V
C 212	0206511	ELECTROLYTIC 22UF 6.3V
C 213	0256781	ELECTROLYTIC 470UF 6.3V
C 214	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 216	0206513	ELECTROLYTIC 22UF 16V
C 217	0256781	ELECTROLYTIC 470UF 6.3V
C 218	0206519	ELECTROLYTIC 47UF 16V
C 219	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C 221	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C 228	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C 401L	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 401R	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 403L	0201054	CERAMIC CHIP 1000PF+-10% 50V
C 403R	0201054	CERAMIC CHIP 1000PF+-10% 50V
C 405L	0209993	CERAMIC CHIP 0.1UF+-10% 25V
C 405R	0209993	CERAMIC CHIP 0.1UF+-10% 25V
C 406L	0201066	CERAMIC CHIP 0.033UF+-10% 25V
C 406R	0201066	CERAMIC CHIP 0.033UF+-10% 25V
C 407L	0206505	ELECTROLYTIC 1UF 50V
C 407R	0206505	ELECTROLYTIC 1UF 50V
C 408L	0206515	ELECTROLYTIC 33UF 10V
C 408R	0206515	ELECTROLYTIC 33UF 10V
C 409L	0206513	ELECTROLYTIC 22UF 16V
C 409R	0206513	ELECTROLYTIC 22UF 16V
C 411L	0209993	CERAMIC CHIP 0.1UF+-10% 25V
C 411R	0209993	CERAMIC CHIP 0.1UF+-10% 25V
C 412L	0209970	CERAMIC CHIP 0.01UF+-10% 50V
C 412R	0209970	CERAMIC CHIP 0.01UF+-10% 50V
C 413L	0206505	ELECTROLYTIC 1UF 50V
C 413R	0206505	ELECTROLYTIC 1UF 50V
C 414L	0206506	ELECTROLYTIC 2.2UF 50V
C 414R	0206506	ELECTROLYTIC 2.2UF 50V
C 415L	0201003	CERAMIC CHIP 0.001UF+-20% 50V
C 415R	0201003	CERAMIC CHIP 0.001UF+-20% 50V
C 416L	0206513	ELECTROLYTIC 22UF 16V
C 416R	0206513	ELECTROLYTIC 22UF 16V
C 417L	0206505	ELECTROLYTIC 1UF 50V
C 417R	0206505	ELECTROLYTIC 1UF 50V
C 418L	0206519	ELECTROLYTIC 47UF 16V
C 418R	0206519	ELECTROLYTIC 47UF 16V
C 419L	0201050	CERAMIC CHIP 470PF+-10% 50V
C 419R	0201050	CERAMIC CHIP 470PF+-10% 50V
C 421L	0201062	CERAMIC CHIP 0.0068UF+-10% 50V
C 421R	0201062	CERAMIC CHIP 0.0068UF+-10% 50V
C 422L	0206505	ELECTROLYTIC 1UF 50V
C 422R	0206505	ELECTROLYTIC 1UF 50V
C 423L	0206505	ELECTROLYTIC 1UF 50V
C 423R	0206505	ELECTROLYTIC 1UF 50V
C 424	0206519	ELECTROLYTIC 47UF 16V
C 425	0206521	ELECTROLYTIC 100UF 6.3V
C 427L	0206509	ELECTROLYTIC 10UF 16V
C 427R	0206509	ELECTROLYTIC 10UF 16V
C 429	0206504	ELECTROLYTIC 0.47UF 50V
C 430	0206519	ELECTROLYTIC 47UF 16V
C 431	0206519	ELECTROLYTIC 47UF 16V
C 432	0206515	ELECTROLYTIC 33UF 10V
C 435L	0206509	ELECTROLYTIC 10UF 16V
C 435R	0206509	ELECTROLYTIC 10UF 16V
C 436L	0206509	ELECTROLYTIC 10UF 16V
C 436R	0206509	ELECTROLYTIC 10UF 16V
C 438L	0201062	CERAMIC CHIP 0.0068UF+-10% 50V
C 438R	0201062	CERAMIC CHIP 0.0068UF+-10% 50V
C 439L	0201059	CERAMIC CHIP 0.0033UF+-10% 50V
C 439R	0201059	CERAMIC CHIP 0.0033UF+-10% 50V
C 440L	0201059	CERAMIC CHIP 0.0033UF+-10% 50V
C 440R	0201059	CERAMIC CHIP 0.0033UF+-10% 50V
C 441	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 442L	0201025	CERAMIC CHIP 33PF+-5% 50V
C 442R	0201025	CERAMIC CHIP 33PF+-5% 50V
C 451	0206519	ELECTROLYTIC 47UF 16V
C 452	0206519	ELECTROLYTIC 47UF 16V
C 453	0206519	ELECTROLYTIC 47UF 16V
C 454	0206504	ELECTROLYTIC 0.47UF 50V
C 461L	0206509	ELECTROLYTIC 10UF 16V
C 461R	0206509	ELECTROLYTIC 10UF 16V
C 462L	0201031	CERAMIC CHIP 100PF+-5% 50V
C 462R	0201031	CERAMIC CHIP 100PF+-5% 50V
C 463	0206519	ELECTROLYTIC 47UF 16V
C 465L	0206513	ELECTROLYTIC 22UF 16V
C 465R	0206513	ELECTROLYTIC 22UF 16V
C 466L	0201003	CERAMIC CHIP 0.001UF+-20% 50V
C 466R	0201003	CERAMIC CHIP 0.001UF+-20% 50V
C 467	0206519	ELECTROLYTIC 47UF 16V
C 468L	0206507	ELECTROLYTIC 3.3UF 50V
C 468R	0206507	ELECTROLYTIC 3.3UF 50V
C 469	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 470L	0206507	ELECTROLYTIC 3.3UF 50V
C 470R	0206507	ELECTROLYTIC 3.3UF 50V
C 471L	0206507	ELECTROLYTIC 3.3UF 50V
C 471R	0206507	ELECTROLYTIC 3.3UF 50V
C 477	0206509	ELECTROLYTIC 10UF 16V
C 478	0206509	ELECTROLYTIC 10UF 16V
C 479	0206509	ELECTROLYTIC 10UF 16V
C 481	0206519	ELECTROLYTIC 47UF 16V
C 482L	0206515	ELECTROLYTIC 33UF 10V
C 483	0206506	ELECTROLYTIC 2.2UF 50V
C 484L	0201012	CERAMIC CHIP 2PF+-0.25% 50V
C 484R	0201012	CERAMIC CHIP 2PF+-0.25% 50V
C 485L	0201012	CERAMIC CHIP 2PF+-0.25% 50V
C 485R	0201012	CERAMIC CHIP 2PF+-0.25% 50V
C 485R	0206515	ELECTROLYTIC 33UF 10V
C 486L	0206515	ELECTROLYTIC 33UF 10V
C 486R	0206515	ELECTROLYTIC 33UF 10V
C 501	0206509	ELECTROLYTIC 10UF 16V
C 502L	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 502R	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 503L	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 503R	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 504	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 505	0206509	ELECTROLYTIC 10UF 16V
C 506	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 507	0206509	ELECTROLYTIC 10UF 16V
C 508	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 509	0206519	ELECTROLYTIC 47UF 16V
C 510L	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 510R	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 511	0201009	CERAMIC CHIP 0.022UF+80-20% 25V

SYMBOL-NO	P-NO	DESCRIPTION
C 512	0206519	ELECTROLYTIC 47UF 16V
C 513	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 514	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 515L	0201001	CERAMIC CHIP 22PF+-5% 50V
C 515R	0201001	CERAMIC CHIP 22PF+-5% 50V
C 516	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 521	0201008	CERAMIC CHIP 0.015UF+-20% 50V
C 522	0201037	CERAMIC CHIP 330PF+-5% 50V
C 523L	0201062	CERAMIC CHIP 0.0068UF+-10% 50V
C 523R	0201062	CERAMIC CHIP 0.0068UF+-10% 50V
C 524L	0201034	CERAMIC CHIP 180PF+-5% 50V
C 524R	0201034	CERAMIC CHIP 180PF+-5% 50V
C 526L	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 526R	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 527L	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 527R	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 529L	0256841	ELECTROLYTIC 4.7UF 25V
C 529R	0256841	ELECTROLYTIC 4.7UF 25V
C 530L	0201054	CERAMIC CHIP 1000PF+-10% 50V
C 530R	0201054	CERAMIC CHIP 1000PF+-10% 50V
C 531L	0206515	ELECTROLYTIC 33UF 10V
C 531R	0206515	ELECTROLYTIC 33UF 10V
C 532L	0206508	ELECTROLYTIC 4.7UF 25V
C 532R	0206508	ELECTROLYTIC 4.7UF 25V
C 533L	0206509	ELECTROLYTIC 10UF 16V
C 533R	0206509	ELECTROLYTIC 10UF 16V
C 534L	0206505	ELECTROLYTIC 1UF 50V
C 534R	0206505	ELECTROLYTIC 1UF 50V
C 535L	0206508	ELECTROLYTIC 4.7UF 25V
C 535R	0206508	ELECTROLYTIC 4.7UF 25V
C 536	0206508	ELECTROLYTIC 4.7UF 25V
C 537	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C 538	0206519	ELECTROLYTIC 47UF 16V
C 539	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 540L	0201038	CERAMIC CHIP 390PF+-5% 50V
C 540R	0201038	CERAMIC CHIP 390PF+-5% 50V
C 541L	0201037	CERAMIC CHIP 330PF+-5% 50V
C 541R	0201037	CERAMIC CHIP 330PF+-5% 50V
C 542	0206519	ELECTROLYTIC 47UF 16V
C 543	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 544	0206519	ELECTROLYTIC 47UF 16V
C 546	0201034	CERAMIC CHIP 180PF+-5% 50V
C 547	0201034	CERAMIC CHIP 180PF+-5% 50V
C 548	0206509	ELECTROLYTIC 10UF 16V
C 549	0206509	ELECTROLYTIC 10UF 16V
C 551	0206509	ELECTROLYTIC 10UF 16V
C 552L	0206519	ELECTROLYTIC 47UF 16V
C 552R	0206519	ELECTROLYTIC 47UF 16V
C 553L	0206509	ELECTROLYTIC 10UF 16V
C 553R	0206509	ELECTROLYTIC 10UF 16V
C 554L	0206509	ELECTROLYTIC 10UF 16V
C 554R	0206509	ELECTROLYTIC 10UF 16V
C 555	0206505	ELECTROLYTIC 1UF 50V
C 556L	0206509	ELECTROLYTIC 10UF 16V
C 556R	0206509	ELECTROLYTIC 10UF 16V
C 557L	0206509	ELECTROLYTIC 10UF 16V
C 557R	0206509	ELECTROLYTIC 10UF 16V
C 558L	0206509	ELECTROLYTIC 10UF 16V
C 558R	0206509	ELECTROLYTIC 10UF 16V
C 559L	0206509	ELECTROLYTIC 10UF 16V
C 559R	0206509	ELECTROLYTIC 10UF 16V
C 560L	0206509	ELECTROLYTIC 10UF 16V
C 560R	0206509	ELECTROLYTIC 10UF 16V
C 561L	0206509	ELECTROLYTIC 10UF 16V
C 561R	0206509	ELECTROLYTIC 10UF 16V
C 562	0206519	ELECTROLYTIC 47UF 16V
C 563	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 564L	0201059	CERAMIC CHIP 0.0033UF+-10% 50V
C 564R	0201059	CERAMIC CHIP 0.0033UF+-10% 50V
C 565	0206519	ELECTROLYTIC 47UF 16V
C 567	0201042	CERAMIC CHIP 820PF+-5% 50V
C 568L	0201031	CERAMIC CHIP 100PF+-5% 50V
C 568R	0201031	CERAMIC CHIP 100PF+-5% 50V
C 601	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 603	0206509	ELECTROLYTIC 10UF 16V
C 604	0206509	ELECTROLYTIC 10UF 16V
C 609	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C 610	0206509	ELECTROLYTIC 10UF 16V
C 611	0206509	ELECTROLYTIC 10UF 16V
C 612	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C 613	0201005	CERAMIC CHIP 0.0047UF+-20% 50V
C 614	0206506	ELECTROLYTIC 2.2UF 50V
C 615	0206521	ELECTROLYTIC 100UF 6.3V
C 616	0206508	ELECTROLYTIC 4.7UF 25V
C 617	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 618	0206509	ELECTROLYTIC 10UF 16V
C 619	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C 620	0206509	ELECTROLYTIC 10UF 16V
C 621	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 625	0206509	ELECTROLYTIC 10UF 16V
C 626	0206509	ELECTROLYTIC 10UF 16V
C 628	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C 629	0206517	ELECTROLYTIC 47UF 6.3V
C 630	0201005	CERAMIC CHIP 0.0047UF+-20% 50V
C 634	0206521	ELECTROLYTIC 100UF 6.3V
C 635	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C 636	0206517	ELECTROLYTIC 47UF 6.3V
C 637	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C 638	0201031	CERAMIC CHIP 100PF+-5% 50V
C 639	0206517	ELECTROLYTIC 47UF 6.3V
C 640	0206517	ELECTROLYTIC 47UF 6.3V
C 641	0206509	ELECTROLYTIC 10UF 16V
C 644	0201054	CERAMIC CHIP 1000PF+-10% 50V
C 645	0201063	CERAMIC CHIP 0.0068UF+-20% 50V
C 646	0206509	ELECTROLYTIC 10UF 16V
C 647	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C 653	0206509	ELECTROLYTIC 10UF 16V
C 654	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C 656	0206509	ELECTROLYTIC 10UF 16V
C 659	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C 660	0201060	CERAMIC CHIP 0.0033UF+-20% 50V
C 663	0201031	CERAMIC CHIP 100PF+-5% 50V
C 664	0201003	CERAMIC CHIP 0.001UF+-20% 50V
C 667	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C 668	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C 671	0201003	CERAMIC CHIP 0.001UF+-20% 50V
C 672	0201003	CERAMIC CHIP 0.001UF+-20% 50V
C 673	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C 674	0201005	CERAMIC CHIP 0.0047UF+-20% 50V
C 702	0256834	ELECTROLYTIC 10UF 16V
C 751	0206509	ELECTROLYTIC 10UF 16V
C 752	0206509	ELECTROLYTIC 10UF 16V
C 759	0206509	ELECTROLYTIC 10UF 16V
C 760	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 761	0206521	ELECTROLYTIC 100UF 6.3V
C 763	0201025	CERAMIC CHIP 33PF+-5% 50V
C 764	0201025	CERAMIC CHIP 33PF+-5% 50V
C 765	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 766	0206509	ELECTROLYTIC 10UF 16V
C 767	0206514	ELECTROLYTIC 33UF 6.3V

SYMBOL-NO	P-NO	DESCRIPTION
C 801	0256871	ELECTROLYTIC 47UF 25V
C 802	0256872	ELECTROLYTIC 100UF 25V
C 803	0256872	ELECTROLYTIC 100UF 25V
C 805	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C 807	0209995	CERAMIC CHIP 1.0UF+80-20% 16V
C 809	0209995	CERAMIC CHIP 1.0UF+80-20% 16V
C 811	0209995	CERAMIC CHIP 1.0UF+80-20% 16V
C 813	0256871	ELECTROLYTIC 47UF 25V
C 814	0201054	CERAMIC CHIP 1000PF+-10% 50V
C 815	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C 852	0206519	ELECTROLYTIC 47UF 16V
C 853	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C 854	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C 855	0206517	ELECTROLYTIC 47UF 6.3V
C 856	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C 857	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C 858	0206517	ELECTROLYTIC 47UF 6.3V
C 860	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C 863	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C 866	0206522	ELECTROLYTIC 220UF 4V
C 868	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C 871	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C 872	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C 873	0206509	ELECTROLYTIC 10UF 16V
C 874	0201003	CERAMIC CHIP 0.001UF+-20% 50V
C 875	0201031	CERAMIC CHIP 100PF+-5% 50V
C 876	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C 877	0206509	ELECTROLYTIC 10UF 16V
C 901	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 902	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 903	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 904	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 905	0206519	ELECTROLYTIC 47UF 16V
C 906	0256789	ELECTROLYTIC 470UF 10V
C 908	0209963	CERAMIC CHIP 0.22UF+80-20% 16V
C 911	0206511	ELECTROLYTIC 22UF 6.3V
C 914	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C 915	0206509	ELECTROLYTIC 10UF 16V
C 917	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C 919	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C1601	0206513	ELECTROLYTIC 22UF 16V
C1602	0206513	ELECTROLYTIC 22UF 16V
C1603	0206513	ELECTROLYTIC 22UF 16V
C1604	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C1605	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C1606	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C1607	0209987	CERAMIC CHIP 0.1UF 50V
C1608	0201061	CERAMIC CHIP 0.0047UF+-10% 50V
C1609	0206509	ELECTROLYTIC 10UF 16V
C1611	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C1612	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C1613	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C1614	0201003	CERAMIC CHIP 0.001UF+-20% 50V
C1617	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C1618	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C1619	0206521	ELECTROLYTIC 100UF 6.3V
C1851	0256486	ELECTROLYTIC 0.47F 5V
C1852	0256486	ELECTROLYTIC 0.47F 5V
C1853	0256486	ELECTROLYTIC 0.47F 5V
C1854	0256486	ELECTROLYTIC 0.47F 5V
C1951	0209963	CERAMIC CHIP 0.22UF+80-20% 16V
C1952	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C1953	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C1954	0201023	CERAMIC CHIP 18PF+-5% 50V
C1955	0201023	CERAMIC CHIP 18PF+-5% 50V
C1956	0201031	CERAMIC CHIP 100PF+-5% 50V
C1957	0201031	CERAMIC CHIP 100PF+-5% 50V
C1958	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C1959	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2002	0201029	CERAMIC CHIP 68PF+-5% 50V
C2004	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2005	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2006	0209995	CERAMIC CHIP 1.0UF+80-20% 16V
C2007	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2008	0209995	CERAMIC CHIP 1.0UF+80-20% 16V
C2009	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2010	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2011	0201020	CERAMIC CHIP 10PF+-0.5% 50V
C2012	0201020	CERAMIC CHIP 10PF+-0.5% 50V
C2013	0201031	CERAMIC CHIP 100PF+-5% 50V
C2014	0201022	CERAMIC CHIP 15PF+-5% 50V
C2107	0206512	ELECTROLYTIC 22UF 10V
C2108	0206509	ELECTROLYTIC 10UF 16V
C2110	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2111	0206517	ELECTROLYTIC 47UF 6.3V
C2114	0206509	ELECTROLYTIC 10UF 16V
C2116	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2117	0206517	ELECTROLYTIC 47UF 6.3V
C2118	0206505	ELECTROLYTIC 1UF 50V
C2119	0206521	ELECTROLYTIC 100UF 6.3V
C2120	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2121	0206517	ELECTROLYTIC 47UF 6.3V
C2122	0206509	ELECTROLYTIC 10UF 16V
C2123	0206505	ELECTROLYTIC 1UF 50V
C2124	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2125	0206517	ELECTROLYTIC 47UF 6.3V
C2126	0206517	ELECTROLYTIC 47UF 6.3V
C2127	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2128	0206509	ELECTROLYTIC 10UF 16V
C2129	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2130	0206522	ELECTROLYTIC 220UF 4V
C2131	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2132	0206517	ELECTROLYTIC 47UF 6.3V
C2133	0206514	ELECTROLYTIC 33UF 6.3V
C2134	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2135	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2136	0206517	ELECTROLYTIC 47UF 6.3V
C2137	0206518	ELECTROLYTIC 47UF 10V
C2138	0206518	ELECTROLYTIC 47UF 10V
C2140	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2141	0201025	CERAMIC CHIP 33PF+-5% 50V
C2142	0206509	ELECTROLYTIC 10UF 16V
C2143	0201017	CERAMIC CHIP 7PF+-0.5% 50V
C2144	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2145	0206517	ELECTROLYTIC 47UF 6.3V
C2146	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2147	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2149	0206511	ELECTROLYTIC 22UF 6.3V
C2151	0206508	ELECTROLYTIC 4.7UF 25V
C2152	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2153	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2154	0206517	ELECTROLYTIC 47UF 6.3V
C2155	0206505	ELECTROLYTIC 1UF 50V
C2156	0201054	CERAMIC CHIP 1000PF+-10% 50V
C2157	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2158	0206515	ELECTROLYTIC 33UF 10V
C2159	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2160	0206509	ELECTROLYTIC 10UF 16V
C2201	0206514	ELECTROLYTIC 33UF 6.3V
C2202	0206511	ELECTROLYTIC 22UF 6.3V

SYMBOL-NO	P-NO	DESCRIPTION
C2203	0206509	ELECTROLYTIC 10UF 16V
C2204	0206509	ELECTROLYTIC 10UF 16V
C2205	0206509	ELECTROLYTIC 10UF 16V
C2206	0206509	ELECTROLYTIC 10UF 16V
C2207	0206517	ELECTROLYTIC 47UF 6.3V
C2208	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2209	0206509	ELECTROLYTIC 10UF 16V
C2210	0206501	ELECTROLYTIC 0.1UF 50V
C2211	0206509	ELECTROLYTIC 10UF 16V
C2212	0206517	ELECTROLYTIC 47UF 6.3V
C2213	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2214	0206508	ELECTROLYTIC 4.7UF 25V
C2215	0206508	ELECTROLYTIC 4.7UF 25V
C2216	0206509	ELECTROLYTIC 10UF 16V
C2217	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2218	0206517	ELECTROLYTIC 47UF 6.3V
C2219	0201036	CERAMIC CHIP 270PF+-5% 50V
C2220	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2221	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2222	0201025	CERAMIC CHIP 33PF+-5% 50V
C2223	0206518	ELECTROLYTIC 47UF 10V
C2224	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2225	0201032	CERAMIC CHIP 120PF+-5% 50V
C2226	0201033	CERAMIC CHIP 150PF+-5% 50V
C2227	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2228	0201030	CERAMIC CHIP 82PF+-5% 50V
C2229	0206517	ELECTROLYTIC 47UF 6.3V
C2230	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2231	0201030	CERAMIC CHIP 82PF+-5% 50V
C2232	0201020	CERAMIC CHIP 10PF+-0.5% 50V
C2233	0201020	CERAMIC CHIP 10PF+-0.5% 50V
C2234	0201023	CERAMIC CHIP 18PF+-5% 50V
C2235	0201026	CERAMIC CHIP 39PF+-5% 50V
C2236	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2237	0201001	CERAMIC CHIP 22PF+-5% 50V
C2238	0201024	CERAMIC CHIP 27PF+-5% 50V
C2239	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2240	0201021	CERAMIC CHIP 12PF+-5% 50V
C2241	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2242	0201021	CERAMIC CHIP 12PF+-5% 50V
C2243	0201025	CERAMIC CHIP 33PF+-5% 50V
C2244	0201029	CERAMIC CHIP 68PF+-5% 50V
C2245	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2246	0201024	CERAMIC CHIP 27PF+-5% 50V
C2247	0201024	CERAMIC CHIP 27PF+-5% 50V
C2248	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2249	0201057	CERAMIC CHIP 0.0022UF+-10% 50V
C2250	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2251	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2252	0206518	ELECTROLYTIC 47UF 10V
C2253	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2254	0206509	ELECTROLYTIC 10UF 16V
C2255	0206504	ELECTROLYTIC 0.47UF 50V
C2256	0206504	ELECTROLYTIC 0.47UF 50V
C2257	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2258	0206501	ELECTROLYTIC 0.1UF 50V
C2259	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2260	0201033	CERAMIC CHIP 150PF+-5% 50V
C2261	0201003	CERAMIC CHIP 0.001UF+-20% 50V
C2262	0201038	CERAMIC CHIP 390PF+-5% 50V
C2263	0206517	ELECTROLYTIC 47UF 6.3V
C2264	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2265	0206517	ELECTROLYTIC 47UF 6.3V
C2266	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2267	0206505	ELECTROLYTIC 1UF 50V

SYMBOL-NO	P-NO	DESCRIPTION
C2268	0206505	ELECTROLYTIC 1UF 50V
C2269	0206505	ELECTROLYTIC 1UF 50V
C2270	0206505	ELECTROLYTIC 1UF 50V
C2281	0206517	ELECTROLYTIC 47UF 6.3V
C2282	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2283	0206508	ELECTROLYTIC 4.7UF 25V
C2288	0206517	ELECTROLYTIC 47UF 6.3V
C2289	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2290	0206517	ELECTROLYTIC 47UF 6.3V
C2292	0206509	ELECTROLYTIC 10UF 16V
C2294	0206509	ELECTROLYTIC 10UF 16V
C2297	0201032	CERAMIC CHIP 120PF+-5% 50V
C2299	0206509	ELECTROLYTIC 10UF 16V
C2301	0206504	ELECTROLYTIC 0.47UF 50V
C2302	0206517	ELECTROLYTIC 47UF 6.3V
C2303	0206509	ELECTROLYTIC 10UF 16V
C2305	0206509	ELECTROLYTIC 10UF 16V
C2306	0206509	ELECTROLYTIC 10UF 16V
C2308	0206509	ELECTROLYTIC 10UF 16V
C2311	0206509	ELECTROLYTIC 10UF 16V
C2312	0206508	ELECTROLYTIC 4.7UF 25V
C2313	0206508	ELECTROLYTIC 4.7UF 25V
C2314	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2316	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C2318	0206501	ELECTROLYTIC 0.1UF 50V
C2319	0209993	CERAMIC CHIP 0.1UF+-10% 25V
C2320	0201028	CERAMIC CHIP 56PF+-5% 50V
C2321	0206506	ELECTROLYTIC 2.2UF 50V
C2322	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2324	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2325	0206504	ELECTROLYTIC 0.47UF 50V
C2326	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2327	0206508	ELECTROLYTIC 4.7UF 25V
C2328	0201030	CERAMIC CHIP 82PF+-5% 50V
C2330	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2331	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2332	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2333	0206517	ELECTROLYTIC 47UF 6.3V
C2334	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2335	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2336	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C2338	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2339	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C2340	0206506	ELECTROLYTIC 2.2UF 50V
C2341	0206501	ELECTROLYTIC 0.1UF 50V
C2342	0206504	ELECTROLYTIC 0.47UF 50V
C2343	0206508	ELECTROLYTIC 4.7UF 25V
C2344	0201030	CERAMIC CHIP 82PF+-5% 50V
C2346	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2347	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2349	0201026	CERAMIC CHIP 39PF+-5% 50V
C2350	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2351	0201036	CERAMIC CHIP 270PF+-5% 50V
C2352	0201030	CERAMIC CHIP 82PF+-5% 50V
C2353	0201036	CERAMIC CHIP 270PF+-5% 50V
C2354	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2355	0206508	ELECTROLYTIC 4.7UF 25V
C2356	0201054	CERAMIC CHIP 1000PF+-10% 50V
C2357	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2358	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2359	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2360	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2361	0201060	CERAMIC CHIP 0.0033UF+-20% 50V
C2362	0201012	CERAMIC CHIP 2PF+-0.25% 50V
C2363	0201025	CERAMIC CHIP 33PF+-5% 50V

SYMBOL-NO	P-NO	DESCRIPTION
C2364	0201073	CERAMIC CHIP 0.068UF+80-20% 25V
C2365	0201031	CERAMIC CHIP 100PF+-5% 50V
C2366	0201001	CERAMIC CHIP 22PF+-5% 50V
C2367	0206508	ELECTROLYTIC 4.7UF 25V
C2368	0206508	ELECTROLYTIC 4.7UF 25V
C2369	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2370	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2371	0201020	CERAMIC CHIP 10PF+-0.5% 50V
C2372	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2373	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2374	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2375	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2376	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2377	0201057	CERAMIC CHIP 0.0022UF+-10% 50V
C2378	0201061	CERAMIC CHIP 0.0047UF+-10% 50V
C2379	0206509	ELECTROLYTIC 10UF 16V
C2380	0201031	CERAMIC CHIP 100PF+-5% 50V
C2380	0201036	CERAMIC CHIP 270PF+-5% 50V
C2381	0201030	CERAMIC CHIP 82PF+-5% 50V
C2382	0201036	CERAMIC CHIP 270PF+-5% 50V
C2383	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2384	0206508	ELECTROLYTIC 4.7UF 25V
C2385	0206503	ELECTROLYTIC 0.33UF 50V
C2386	0206508	ELECTROLYTIC 4.7UF 25V
C2387	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2388	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2389	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2390	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2391	0206509	ELECTROLYTIC 10UF 16V
C2392	0206511	ELECTROLYTIC 22UF 6.3V
C2393	0201020	CERAMIC CHIP 10PF+-0.5% 50V
C2394	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2395	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2396	0206511	ELECTROLYTIC 22UF 6.3V
C2397	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2398	0206508	ELECTROLYTIC 4.7UF 25V
C2399B	0201054	CERAMIC CHIP 1000PF+-10% 50V
C2400	0201024	CERAMIC CHIP 27PF+-5% 50V
C2400	0201029	CERAMIC CHIP 68PF+-5% 50V
C2401	0201029	CERAMIC CHIP 68PF+-5% 50V
C2402	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2403	0206511	ELECTROLYTIC 22UF 6.3V
C2404	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2405	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2406	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2407	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2408	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2409	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2410	0201059	CERAMIC CHIP 0.0033UF+-10% 50V
C2411	0201012	CERAMIC CHIP 2PF+-0.25% 50V
C2412	0201025	CERAMIC CHIP 33PF+-5% 50V
C2413	0201043	CERAMIC CHIP 100PF+-10% 50V
C2414	0201073	CERAMIC CHIP 0.068UF+80-20% 25V
C2415	0201027	CERAMIC CHIP 47PF+-5% 50V
C2421	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2423	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2424	0201015	CERAMIC CHIP 5PF+-0.25% 50V
C2425	0201997	CERAMIC DISC 0.1UF+80-20% 50V
C2451	0206517	ELECTROLYTIC 47UF 6.3V
C2452	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2453	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2454	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2455	0206505	ELECTROLYTIC 1UF 50V
C2501	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2502	0206517	ELECTROLYTIC 47UF 6.3V

SYMBOL-NO	P-NO	DESCRIPTION
C2503	0206509	ELECTROLYTIC 10UF 16V
C2504	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C2505	0206508	ELECTROLYTIC 4.7UF 25V
C2506	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2507	0206517	ELECTROLYTIC 47UF 6.3V
C2508	0201032	CERAMIC CHIP 120PF+-5% 50V
C2509	0201020	CERAMIC CHIP 10PF+-0.5% 50V
C2510	0209989	CERAMIC CHIP 0.1UF+-20% 25V
C2511	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2512	0206517	ELECTROLYTIC 47UF 6.3V
C2513	0206505	ELECTROLYTIC 1UF 50V
C2514	0206501	ELECTROLYTIC 0.1UF 50V
C2515	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2516	0206505	ELECTROLYTIC 1UF 50V
C2517	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2518	0206505	ELECTROLYTIC 1UF 50V
C2519	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2520	0206517	ELECTROLYTIC 47UF 6.3V
C2521	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2522	0206517	ELECTROLYTIC 47UF 6.3V
C2523	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2524	0206511	ELECTROLYTIC 22UF 6.3V
C2525	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2526	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2527	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2528	0201026	CERAMIC CHIP 39PF+-5% 50V
C2529	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2530	0206518	ELECTROLYTIC 47UF 10V
C2531	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2532	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2533	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2534	0206518	ELECTROLYTIC 47UF 10V
C2535	0206511	ELECTROLYTIC 22UF 6.3V
C2536	0206511	ELECTROLYTIC 22UF 6.3V
C2537	0201033	CERAMIC CHIP 150PF+-5% 50V
C2538	0201041	CERAMIC CHIP 680PF+-5% 50V
C2539	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2540	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2541	0206511	ELECTROLYTIC 22UF 6.3V
C2542	0206511	ELECTROLYTIC 22UF 6.3V
C2543	0206511	ELECTROLYTIC 22UF 6.3V
C2544	0201033	CERAMIC CHIP 150PF+-5% 50V
C2545	0201041	CERAMIC CHIP 680PF+-5% 50V
C2546	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2547	0201001	CERAMIC CHIP 22PF+-5% 50V
C2548	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2549	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2550	0206517	ELECTROLYTIC 47UF 6.3V
C2551	0201022	CERAMIC CHIP 15PF+-5% 50V
C2553	0201031	CERAMIC CHIP 100PF+-5% 50V
C2601	0206508	ELECTROLYTIC 4.7UF 25V
C2602	0201023	CERAMIC CHIP 18PF+-5% 50V(PBK)
C2602D	0206511	ELECTROLYTIC 22UF 6.3V(SPF)
C2603	0201023	CERAMIC CHIP 18PF+-5% 50V(PBK)
C2603D	0201069	CERAMIC CHIP 0.1UF+80-20% 25V(SPF)
C2604	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2605	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2606	0201061	CERAMIC CHIP 0.0047UF+-10% 50V
C2607	0201061	CERAMIC CHIP 0.0047UF+-10% 50V
C2608	0201039	CERAMIC CHIP 470PF+-5% 50V
C2609	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2610	0201054	CERAMIC CHIP 1000PF+-10% 50V
C2701	0206511	ELECTROLYTIC 22UF 6.3V
C2702	0201031	CERAMIC CHIP 100PF+-5% 50V
C2703	0201024	CERAMIC CHIP 27PF+-5% 50V

SYMBOL-NO	P-NO	DESCRIPTION
C2704	0206505	ELECTROLYTIC 1UF 50V
C2705	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2706	0206517	ELECTROLYTIC 47UF 6.3V
C2707	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2708	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2709	0206517	ELECTROLYTIC 47UF 6.3V
C2710	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2711	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2712	0206511	ELECTROLYTIC 22UF 6.3V
C2713	0206517	ELECTROLYTIC 47UF 6.3V
C2714	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2715	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2716	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2717	0206511	ELECTROLYTIC 22UF 6.3V
C2718	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2719	0206511	ELECTROLYTIC 22UF 6.3V
C2720	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2721	0206511	ELECTROLYTIC 22UF 6.3V
C2722	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2723	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2724	0206517	ELECTROLYTIC 47UF 6.3V
C2725	0206509	ELECTROLYTIC 10UF 16V
C2726	0206511	ELECTROLYTIC 22UF 6.3V
C2727	0206505	ELECTROLYTIC 1UF 50V
C2728	0206509	ELECTROLYTIC 10UF 16V
C2729	0206511	ELECTROLYTIC 22UF 6.3V
C2730	0206505	ELECTROLYTIC 1UF 50V
C2731	0201994	CERAMIC DISC 0.22UF+80-20% 50V
C2732	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C2733	0206517	ELECTROLYTIC 47UF 6.3V
C2734	0206506	ELECTROLYTIC 2.2UF 50V
C2735	0201066	CERAMIC CHIP 0.033UF+-10% 25V
C2736	0201020	CERAMIC CHIP 10PF+-0.5% 50V
C2737	0201022	CERAMIC CHIP 15PF+-5% 50V
C2738	0206517	ELECTROLYTIC 47UF 6.3V
C2739	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2740	0206509	ELECTROLYTIC 10UF 16V
C2741	0201058	CERAMIC CHIP 0.0022UF+-20% 50V
C2742	0201052	CERAMIC CHIP 680PF+-10% 50V
C2743	0206505	ELECTROLYTIC 1UF 50V
C2744	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C2745	0201003	CERAMIC CHIP 0.001UF+-20% 50V
C2747	0206509	ELECTROLYTIC 10UF 16V
C2748	0201031	CERAMIC CHIP 100PF+-5% 50V
C2749	0201056	CERAMIC CHIP 0.0015UF+-10% 50V
C2750	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2751	0206511	ELECTROLYTIC 22UF 6.3V
C2752	0201036	CERAMIC CHIP 270PF+-5% 50V
C2753	0201039	CERAMIC CHIP 470PF+-5% 50V
C2754	0201036	CERAMIC CHIP 270PF+-5% 50V
C2755	0201039	CERAMIC CHIP 470PF+-5% 50V
C2756	0201029	CERAMIC CHIP 68PF+-5% 50V
C2757	0206517	ELECTROLYTIC 47UF 6.3V
C2758	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2759	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2760	0206511	ELECTROLYTIC 22UF 6.3V
C2761	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2762	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2763	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2764	0206509	ELECTROLYTIC 10UF 16V
C2765	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2766	0206509	ELECTROLYTIC 10UF 16V
C2767	0206509	ELECTROLYTIC 10UF 16V
C2768	0206509	ELECTROLYTIC 10UF 16V
C2769	0201006	CERAMIC CHIP 0.01UF+80-20% 50V

SYMBOL-NO	P-NO	DESCRIPTION
C2770	0206509	ELECTROLYTIC 10UF 16V
C2771	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2772	0206517	ELECTROLYTIC 47UF 6.3V
C2773	0209991	CERAMIC CHIP 0.068UF+-20% 25V
C2774	0206511	ELECTROLYTIC 22UF 6.3V
C2775	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2776	0206517	ELECTROLYTIC 47UF 6.3V
C2778	0201054	CERAMIC CHIP 1000PF+-10% 50V
C2779	0201028	CERAMIC CHIP 56PF+-5% 50V
C2780	0206518	ELECTROLYTIC 47UF 10V
C2781	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2782	0201096	CERAMIC CHIP 82PF+-5% 50V
C2783	0201097	CERAMIC CHIP 100PF+-5% 50V
C2785	0201093	CERAMIC CHIP 33PF+-5% 50V
C2786	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2787	0201097	CERAMIC CHIP 100PF+-5% 50V
C2788	0209836	CERAMIC CHIP 0.001UF+-20% 50V
C2789	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2790	0206517	ELECTROLYTIC 47UF 6.3V
C2791	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2792	0103882	JAMPER CHIP
C2793	0201092	CERAMIC CHIP 22PF+-5% 50V
C2794	0206518	ELECTROLYTIC 47UF 10V
C2795	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2796	0206511	ELECTROLYTIC 22UF 6.3V
C2797	0201039	CERAMIC CHIP 470PF+-5% 50V
C2798	0201054	CERAMIC CHIP 1000PF+-10% 50V
C2799	0201061	CERAMIC CHIP 0.0047UF+-10% 50V
C2800	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2801	0206517	ELECTROLYTIC 47UF 6.3V
C2811	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2815	0201091	CERAMIC CHIP 18PF+-5% 50V
C2816	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2833	0201054	CERAMIC CHIP 1000PF+-10% 50V
C2834	0201054	CERAMIC CHIP 1000PF+-10% 50V
C2835	0201054	CERAMIC CHIP 1000PF+-10% 50V
C2836	0201054	CERAMIC CHIP 1000PF+-10% 50V
C2837	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2838	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2839	0206518	ELECTROLYTIC 47UF 10V
C2840	0206512	ELECTROLYTIC 22UF 10V
C2841	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2842	0201094	CERAMIC CHIP 47PF+-5% 50V
C2843	0201094	CERAMIC CHIP 47PF+-5% 50V
C2844	0201094	CERAMIC CHIP 47PF+-5% 50V
C2845	0201026	CERAMIC CHIP 39PF+-5% 50V
C2846	0201023	CERAMIC CHIP 18PF+-5% 50V
C2847	0206517	ELECTROLYTIC 47UF 6.3V
C2848	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2849	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2850	0201097	CERAMIC CHIP 100PF+-5% 50V
C2851	0201094	CERAMIC CHIP 47PF+-5% 50V
C2852	0201094	CERAMIC CHIP 47PF+-5% 50V
C2853	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2854	0206512	ELECTROLYTIC 22UF 10V
C2855	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2856	0206518	ELECTROLYTIC 47UF 10V
C2857	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2858	0206518	ELECTROLYTIC 47UF 10V
C2859	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2860	0201009	CERAMIC CHIP 0.022UF+80-20% 25V
C2862	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2863	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2865	0201069	CERAMIC CHIP 0.1UF+80-20% 25V
C2866	0206501	ELECTROLYTIC 0.1UF 50V

SYMBOL-NO	P-NO	DESCRIPTION
C2867	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2869	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2870	0206509	ELECTROLYTIC 10UF 16V
C2871	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2872	0206511	ELECTROLYTIC 22UF 6.3V
C2873	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2886	0201054	CERAMIC CHIP 1000PF+-10% 50V
C2887	0201023	CERAMIC CHIP 18PF+-5% 50V
C2903	0206518	ELECTROLYTIC 47UF 10V
C2906	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2908	0201006	CERAMIC CHIP 0.01UF+80-20% 50V
C2914	0201004	CERAMIC CHIP 0.0015UF+-20% 50V
C7601	0201039	CERAMIC CHIP 470PF+-5% 50V
CT2001	5058575	TRIMMER
CT2701	5058575	TRIMMER

RESISTORS

SYMBOL-NO	P-NO	DESCRIPTION
R 001	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 201	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 202	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R 203	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 204	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R 205	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 206	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R 207	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R 208	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 209	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 210	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R 211	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R 212	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 213	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 214	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R 219	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R 220	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 221	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 222	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R 223	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R 224	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R 225	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R 226	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 227	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 228	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 229	0103893	CHIP RESISTOR 75 OHM+-5% 1/8W
R 230	0103893	CHIP RESISTOR 75 OHM+-5% 1/8W
R 231	0103893	CHIP RESISTOR 75 OHM+-5% 1/8W
R 232	0103893	CHIP RESISTOR 75 OHM+-5% 1/8W
R 233	0103893	CHIP RESISTOR 75 OHM+-5% 1/8W
R 234	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 235	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 236	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 237	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 238	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 239	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R 240	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R 241	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R 242	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R 243	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 244	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R 245	0103832	CHIP RESISTOR 120OHM+-5% 0.1W
R 246	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 247	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R 249	0103893	CHIP RESISTOR 75 OHM+-5% 1/8W
R 251	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 255	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R 401L	0103819	CHIP RESISTOR 10 OHM+-5% 0.1W
R 401R	0103819	CHIP RESISTOR 10 OHM+-5% 0.1W
R 402L	0103869	CHIP RESISTOR 150KOHM+-5% 0.1W
R 402R	0103869	CHIP RESISTOR 150KOHM+-5% 0.1W
R 404L	0103832	CHIP RESISTOR 120OHM+-5% 0.1W
R 404R	0103832	CHIP RESISTOR 120OHM+-5% 0.1W
R 405L	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 405R	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 406L	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 406R	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 407L	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R 407R	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R 408L	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W
R 408R	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W
R 409L	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R 409R	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R 410L	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R 410R	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R 411L	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R 411R	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R 412L	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 412R	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 413L	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R 413R	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R 414L	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 414R	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 415L	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R 415R	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R 416	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 417L	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R 417R	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R 418	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R 419L	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 419R	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 420L	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 420R	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 421L	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 421R	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 422L	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 422R	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 423L	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 423R	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 424	0103862	CHIP RESISTOR 39KOHM+-5% 0.1W
R 425L	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 425R	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 426L	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R 426R	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R 427L	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 427R	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 428	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 429L	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R 429R	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R 430	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 431	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 432	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 433	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 434	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 435	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 436	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R 437L	0103833	CHIP RESISTOR 150 OHM+-5% 0.1W
R 437R	0103833	CHIP RESISTOR 150 OHM+-5% 0.1W
R 438L	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 438R	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 439L	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R 439R	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R 440L	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R 440R	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R 441L	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 441R	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 442L	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 442R	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 446	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 447	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 448	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 449	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 450	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 451	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R 452	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 453	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 454	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R 456	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R 457	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R 458	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R 459	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R 460	0103876	CHIP RESISTOR 560KOHM+-5% 0.1W
R 461	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 465L	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 465R	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 470L	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R 470R	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R 471L	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 471R	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 472L	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 472R	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 473L	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 473R	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 474	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 475	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 476L	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 476R	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 477	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R 478	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R 479	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 480	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 481	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 482	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 483L	0103876	CHIP RESISTOR 560KOHM+-5% 0.1W
R 483R	0103876	CHIP RESISTOR 560KOHM+-5% 0.1W
R 484L	0103870	CHIP RESISTOR 180KOHM+-5% 0.1W
R 484R	0103870	CHIP RESISTOR 180KOHM+-5% 0.1W
R 485L	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R 485R	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R 486L	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R 486R	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R 490L	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 490R	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 491L	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 491R	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 492L	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 492R	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 493L	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 493R	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 495	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 496	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 497	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 498	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 501L	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 501R	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 502	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R 503	0103813	CHIP RESISTOR 3.3 OHM+-10% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R 504	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 505	0103813	CHIP RESISTOR 3.3 OHM+-10% 0.1W
R 506	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 507L	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 507R	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 508	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 509	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 510	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 511	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 512	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 514L	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R 514R	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R 515L	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 515R	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 520	0103869	CHIP RESISTOR 150KOHM+-5% 0.1W
R 521	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R 522L	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R 522R	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 523L	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R 523R	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 524L	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R 524R	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R 526	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 527	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 528	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R 529	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 530	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 531L	0142828	CHIP RESISTOR 56 OHM+-5%
R 531R	0142828	CHIP RESISTOR 56 OHM+-5%
R 540	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 541	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 542	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R 543	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R 544	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 545	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 546	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 547L	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 547R	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 551L	0103829	CHIP RESISTOR 68OHM+-5% 0.1W
R 551R	0103829	CHIP RESISTOR 68OHM+-5% 0.1W
R 552	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 553L	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 553R	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 554	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 555	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R 556L	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 556R	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 557L	0103856	CHIP RESISTOR 12KOHM+-5% 0.1W
R 557R	0103856	CHIP RESISTOR 12KOHM+-5% 0.1W
R 560	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 561	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 601	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 602	0103882	JAMPER CHIP
R 603	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 604	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 606	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R 607	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 608	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 609	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 610	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 611	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R 612	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R 613	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 614	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 615	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R 616	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 617	0103866	CHIP RESISTOR 82KOHM+-5% 0.1W
R 618	0103869	CHIP RESISTOR 150KOHM+-5% 0.1W
R 619	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R 620	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 621	0103873	CHIP RESISTOR 330KOHM+-5% 0.1W
R 622	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R 624	0103838	CHIP RESISTOR 390 OHM+-5% 0.1W
R 625	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 626	0103875	CHIP RESISTOR 470KOHM+-5% 0.1W
R 627	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R 628	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 629	0103873	CHIP RESISTOR 330KOHM+-5% 0.1W
R 630	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R 631	0103865	CHIP RESISTOR 68KOHM+-5% 0.1W
R 632	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 635	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 636	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 637	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 638	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 639	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 640	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 641	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R 644	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 645	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R 646	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 647	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 649	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 650	0103869	CHIP RESISTOR 150KOHM+-5% 0.1W
R 651	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R 653	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 654	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 656	0103870	CHIP RESISTOR 180KOHM+-5% 0.1W
R 657	0103870	CHIP RESISTOR 180KOHM+-5% 0.1W
R 658	0103870	CHIP RESISTOR 180KOHM+-5% 0.1W
R 659	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 660	0103869	CHIP RESISTOR 150KOHM+-5% 0.1W
R 661	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 662	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 663	0103866	CHIP RESISTOR 82KOHM+-5% 0.1W
R 667	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R 668	0103865	CHIP RESISTOR 68KOHM+-5% 0.1W
R 670	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 671	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 673	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 674	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 675	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R 676	0103856	CHIP RESISTOR 12KOHM+-5% 0.1W
R 677	0103856	CHIP RESISTOR 12KOHM+-5% 0.1W
R 678	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 679	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 680	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R 681	0103869	CHIP RESISTOR 150KOHM+-5% 0.1W
R 683	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R 684	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R 685	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 686	0103856	CHIP RESISTOR 12KOHM+-5% 0.1W
R 688	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 689	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 691	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 692	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R 694	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R 695	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 696	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 698	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R 699	0103875	CHIP RESISTOR 470KOHM+-5% 0.1W
R 701	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 702	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R 703	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 708	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 709	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 710	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 711	0103862	CHIP RESISTOR 39KOHM+-5% 0.1W
R 712	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R 713	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 714	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 751	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 752	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 753	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 754	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R 755	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R 756	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 757	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 758	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 759	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 760	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 761	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 762	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 763	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 764	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 765	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 766	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 767	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 768	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 769	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 770	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 771	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 772	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 773	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 774	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 775	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 776	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 777	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 778	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 779	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 780	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 781	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 782	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 783	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 784	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 785	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 786	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 787	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 738	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 789	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 790	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 791	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 792	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 793	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 794	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 795	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 796	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 797	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 798	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 799	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 801	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 802	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R 803	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 804	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R 805	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R 808	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R 809	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R 810	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 811	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 853	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 854	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 855	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R 856	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 857	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 858	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R 859	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R 860	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R 861	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R 862	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 868	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 869	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 871	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 872	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R 873	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R 879	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R 880	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 881	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 882	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 883	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 901	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 902	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 903	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 904	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 905	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 910	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 911	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 912	0103881	CHIP RESISTOR 2.2MOHM+-10% 0.1W
R 913	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R 914	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 915	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 917	0103881	CHIP RESISTOR 2.2MOHM+-10% 0.1W
R 918	0103833	CHIP RESISTOR 150 OHM+-5% 0.1W
R 919	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 920	0103827	CHIP RESISTOR 47 OHM+-5% 0.1W
R 922	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 923	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 924	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 925	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 926	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 928	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 929	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 930	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 932	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 935	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 936	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 937	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 938	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R 939	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 940	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 942	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 944	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R 946	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R 947	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R 949	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 950	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 951	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 953	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 954	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 955	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 956	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R 957	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 958	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 959	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 960	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 961	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 962	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 963	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 964	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 967	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R 970	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 971	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 972	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 973	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 974	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 976	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 979	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 982	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R 984	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 985	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 986	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 994	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 996	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 997	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 998	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W
R1601	0103819	CHIP RESISTOR 10 OHM+-5% 0.1W
R1602	0103819	CHIP RESISTOR 10 OHM+-5% 0.1W
R1603	0103819	CHIP RESISTOR 10 OHM+-5% 0.1W
R1604	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W
R1605	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1606	0103812	CHIP RESISTOR 2.7OHM+-10% 0.1W
R1607	0103812	CHIP RESISTOR 2.7OHM+-10% 0.1W
R1608	0103812	CHIP RESISTOR 2.7OHM+-10% 0.1W
R1609	0103812	CHIP RESISTOR 2.7OHM+-10% 0.1W
R1610	0103812	CHIP RESISTOR 2.7OHM+-10% 0.1W
R1611	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R1612	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R1613	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R1614	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R1615	0103881	CHIP RESISTOR 2.2MOHM+-10% 0.1W
R1616	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R1617	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R1618	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R1619	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R1620	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R1621	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R1622	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R1623	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R1624	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R1625	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R1626	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1627	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1628	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1629	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R1630	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1631	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1632	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1633	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1634	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1635	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R1636	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1637	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1639	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1640	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1641	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R1644	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R1645	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1646	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1647	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1648	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1649	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R1650	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R1655	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R1656	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R1657	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R1662	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1663	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R1664	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R1667	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R1668	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1669	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R1670	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1671	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R1672	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R1673	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W(SERVO)
R1673D	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W(DMD)
R1674	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W(SERVO)
R1674D	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W(DMD)
R1675	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W(SERVO)
R1675D	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W(DMD)
R1676	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W(SERVO)
R1676D	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W(DMD)
R1677	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R1677D	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R1678	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1680	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R1681	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R1682	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1683	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R1684	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R1751	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R1752	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1753	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1754	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1755	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R1756	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1757	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1758	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W
R1760	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1761	0103868	CHIP RESISTOR 120KOHM+-5% 0.1W
R1762	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1763	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1764	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1766	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1767	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R1768	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R1769	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R1770	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R1771	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R1772	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R1774	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R1776	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R1777	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R1778	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1779	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1780	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1781	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R1782	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R1786	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1787	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1788	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R1789	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1790	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1791	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1792	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1793	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1794	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1795	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1796	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1797	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R1798	0103833	CHIP RESISTOR 150 OHM+-5% 0.1W
R1853	0103823	CHIP RESISTOR 22OHM+-5% 0.1W
R1901	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R1902	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R1903	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R1904	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1905	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R1908	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1909	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1910	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1911	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R1912	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R1913	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R1914	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R1915	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1916	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R1917	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R1918	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R1919	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1920	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R1921	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R1922	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1923	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1926	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1927	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1928	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1929	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1930	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R1931	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R1932	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R1933	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R1934	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R1935	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1936	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1937	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1938	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1939	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1942	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R1943	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R1944	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R1945	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R1946	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R1947	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R1948	0103836	CHIP RESISTOR 270 OHM+-5% 0.1W
R1949	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R1950	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R1951	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W(MAS)
R1951R	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W(REM)
R1952	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R1953	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R1954	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R1955	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R1956	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R1957	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R1958	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R1959	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R1960	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R1961	0103868	CHIP RESISTOR 120KOHM+-5% 0.1W
R1962	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R1963	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R1964	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R1965	0103868	CHIP RESISTOR 120KOHM+-5% 0.1W
R1966	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R1967	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R1968	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W
R1969	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1970	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R1971	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R1972	0103826	CHIP RESISTOR 39 OHM+-5% 0.1W
R1973	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R1974	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R1975	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R1976	0103826	CHIP RESISTOR 39 OHM+-5% 0.1W
R1977	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R1978	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1979	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1980	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1981	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1982	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1983	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1984	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1985	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1986	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1987	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1988	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1989	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1990	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1991	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R1992	0103882	JAMPER CHIP
R2001	0103862	CHIP RESISTOR 39KOHM+-5% 0.1W
R2002	0103865	CHIP RESISTOR 68KOHM+-5% 0.1W
R2003	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R2004	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R2005	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R2006	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R2007	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R2009	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2114	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2115	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2116	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R2118	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2128	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2130	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2131	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2133	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2134	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R2135	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2136	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2137	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2138	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2139	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2140	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R2141	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2142	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R2143	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R2144	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2145	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2147	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2148	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2149	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2150	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R2151	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2152	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2153	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2154	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2155	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2156	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R2157	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2158	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2159	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2161	0103897	CHIP RESISTOR 360 OHM+-5% 0.1W
R2164	0103865	CHIP RESISTOR 68KOHM+-5% 0.1W
R2166	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2167	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2168	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2169	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2170	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2171	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2172	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2173	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R2174	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R2175	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2176	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2178	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2179	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2180	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2181	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W
R2182	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2183	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R2184	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2185	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2186	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2187	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2201	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2202	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2203	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2204	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2205	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2206	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2207	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2208	0103834	CHIP RESISTOR 180OHM+-5% 0.1W
R2209	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R2210	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R2211	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R2212	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R2213	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2214	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R2215	0103838	CHIP RESISTOR 390 OHM+-5% 0.1W
R2216	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R2217	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2218	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2219	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R2220	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R2221	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R2222	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R2223	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R2224	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2225	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R2226	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R2227	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2228	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2229	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R2230	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2231	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R2232	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R2233	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R2234	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R2235	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R2236	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2237	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R2238	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2239	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2240	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R2241	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2242	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2243	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2244	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R2245	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2246	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R2247	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R2248	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R2249	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R2250	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2251	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2252	0103836	CHIP RESISTOR 270 OHM+-5% 0.1W
R2253	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2254	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R2255	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2256	0103865	CHIP RESISTOR 68KOHM+-5% 0.1W
R2257	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R2258	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2259	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R2261	0103829	CHIP RESISTOR 68OHM+-5% 0.1W
R2263	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R2264	0103862	CHIP RESISTOR 39KOHM+-5% 0.1W
R2265	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2266	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R2267	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R2268	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2269	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2270	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R2271	0103834	CHIP RESISTOR 180 OHM+-5% 0.1W
R2272	0103834	CHIP RESISTOR 180OHM+-5% 0.1W
R2273	0103834	CHIP RESISTOR 180OHM+-5% 0.1W
R2274	0103822	CHIP RESISTOR 18OHM+-5% 0.1W
R2277	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R2279	0103875	CHIP RESISTOR 470KOHM+-5% 0.1W
R2280	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2282	0103874	CHIP RESISTOR 390KOHM+-5% 0.1W
R2283	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2284	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2285	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R2286	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2287	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2288	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R2289	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R2290	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R2291	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R2292	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R2293	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2298	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R2299	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R2300	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2302	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2303	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2306	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2309	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2310	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2311	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2313	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2314	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R2315	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2316	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R2317	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2318	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2319	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R2320	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2321	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R2322	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2323	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2330	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R2331	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R2332	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2333	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2334	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2335	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2336	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2337	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2338	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2339	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2340	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2341	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R2342	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R2343	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2345	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2346	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2347	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2348	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2349	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2350	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2351	0103838	CHIP RESISTOR 390 OHM+-5% 0.1W
R2352	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R2353	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2354	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2355	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R2356	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R2357	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2358	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2359	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2360	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2361	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2362	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R2363	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2364	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R2366	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2367	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R2368	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2369	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2370	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2371	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R2372	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2373	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2374	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2375	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2376	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2378	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2379	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2380	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R2381	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2382	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2383	0103819	CHIP RESISTOR 10 OHM+-5% 0.1W
R2384	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R2385	0103856	CHIP RESISTOR 12KOHM+-5% 0.1W
R2386	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R2387	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2388	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R2389	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2391	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R2392	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2393	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R2394	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2395	0103838	CHIP RESISTOR 390 OHM+-5% 0.1W
R2396	0103894	CHIP RESISTOR 5.1KOHM+-5% 0.1W
R2397	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2399	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2400	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R2401	0103838	CHIP RESISTOR 390 OHM+-5% 0.1W(ENC)
R2401V	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W(VID)
R2402	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W(ENC)
R2402V	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W(VID)
R2403	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W(ENC)
R2403V	0103866	CHIP RESISTOR 82KOHM+-5% 0.1W(VID)
R2404	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W(ENC)
R2404V	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W(VID)
R2405	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W(ENC)
R2406	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W(ENC)
R2406V	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W(VID)
R2407	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W(ENC)
R2407V	0103838	CHIP RESISTOR 390OHM+-5% 0.1W(VID)
R2408	0103865	CHIP RESISTOR 68KOHM+-5% 0.1W
R2451	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R2452	0103866	CHIP RESISTOR 82KOHM+-5% 0.1W
R2501	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R2502	0103865	CHIP RESISTOR 68KOHM+-5% 0.1W
R2503	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2504	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R2505	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R2506	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2507	0103827	CHIP RESISTOR 47 OHM+-5% 0.1W
R2508	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2509	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2510	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2511	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2512	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R2513	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R2514	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R2515	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2516	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R2517	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R2518	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R2519	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R2520	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R2521	0103829	CHIP RESISTOR 68OHM+-5% 0.1W
R2522	0103829	CHIP RESISTOR 68OHM+-5% 0.1W
R2523	0103893	CHIP RESISTOR 75 OHM+-5% 1/8W
R2524	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2525	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2526	0103893	CHIP RESISTOR 75 OHM+-5% 1/8W
R2527	0103833	CHIP RESISTOR 150 OHM+-5% 0.1W
R2528	0103833	CHIP RESISTOR 150 OHM+-5% 0.1W
R2529	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2530	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2531	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2532	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2533	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2534	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R2535	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R2536	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2537	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2538	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2539	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R2540	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2541	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2542	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R2543	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2544	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2545	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2546	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2547	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2548	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2549	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2550	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2551	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2552	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R2553	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2554	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2555	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2556	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2557	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R2558	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R2559	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2560	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R2564	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2565	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2566	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R2567	0103825	CHIP RESISTOR 33OHM+-5% 0.1W
R2568	0103825	CHIP RESISTOR 33OHM+-5% 0.1W
R2569	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R2570	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R2580	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R2581	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2582	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2583	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W
R2584	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R2585	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R2586	0103838	CHIP RESISTOR 390 OHM+-5% 0.1W
R2587	0103838	CHIP RESISTOR 390 OHM+-5% 0.1W
R2591	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R2592	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R2594	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R2598	0103875	CHIP RESISTOR 470KOHM+-5% 0.1W
R2601	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W(SPF)
R2601P	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W(PBK)
R2602	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W(SPF)
R2602P	0103869	CHIP RESISTOR 150KOHM+-5% 0.1W(PBK)
R2603	0103866	CHIP RESISTOR 82KOHM+-5% 0.1W(SPF)
R2603P	0103873	CHIP RESISTOR 330KOHM+-5% 0.1W(PBK)
R2604	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W(SPF)
R2604P	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W(PBK)
R2605	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W(SPF)
R2605P	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W(PBK)
R2606	0103876	CHIP RESISTOR 560KOHM+-5% 0.1W(SPF)
R2607	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W(SPF)
R2607P	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W(PBK)
R2608	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W(SPF)
R2608P	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W(PBK)
R2609	0103879	CHIP RESISTOR 1MOHM+-5% 0.1W(SPF)
R2701	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R2702	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R2703	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R2704	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R2705	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2706	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R2707	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2708	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R2709	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R2710	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2711	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2712	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2713	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2714	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2715	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2716	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2717	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2718	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2719	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R2720	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2721	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2722	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2723	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2724	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2725	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2726	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2727	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2728	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2729	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2730	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2731	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2732	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2733	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2734	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2735	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2736	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2737	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R2738	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2739	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R2740	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2741	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2742	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2743	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R2744	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R2745	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2746	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2747	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2748	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R2749	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2750	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2751	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R2752	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2753	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2754	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2755	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2756	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2757	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2758	0103836	CHIP RESISTOR 270 OHM+-5% 0.1W
R2759	0103834	CHIP RESISTOR 180OHM+-5% 0.1W
R2760	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2761	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2762	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2763	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R2764	0103841	CHIP RESISTOR 680 OHM+-5% 0.1W
R2765	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R2766	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2767	0103838	CHIP RESISTOR 390 OHM+-5% 0.1W
R2768	0103835	CHIP RESISTOR 220 OHM+-5% 0.1W
R2769	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2770	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2771	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R2772	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2773	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2774	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R2775	0103868	CHIP RESISTOR 120KOHM+-5% 0.1W
R2776	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2778	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R2779	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R2780	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R2781	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2782	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2783	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2784	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2785	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2786	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2787	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2788	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2789	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2790	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2791	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R2792	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2793	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2794	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2795	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2796	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2797	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2798	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2799	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2800	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2801	0103893	CHIP RESISTOR 75 OHM+-5% 1/8W
R2802	0103893	CHIP RESISTOR 75 OHM+-5% 1/8W
R2803	0103893	CHIP RESISTOR 75 OHM+-5% 1/8W
R2804	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R2805	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2806	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2807	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R2808	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2809	0103868	CHIP RESISTOR 120KOHM+-5% 0.1W
R2810	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R2811	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R2812	0103838	CHIP RESISTOR 390 OHM+-5% 0.1W
R2813	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R2814	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2815	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R2816	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W
R2817	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2818	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R2819	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2820	0103866	CHIP RESISTOR 82KOHM+-5% 0.1W
R2821	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R2822	0103854	CHIP RESISTOR 8.2KOHM+-5% 0.1W
R2823	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R2824	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2825	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2826	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2827	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2828	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2829	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R2830	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R2831	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R2832	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R2833	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2834	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R2835	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2836	0103853	CHIP RESISTOR 6.8KOHM+-5% 0.1W
R2837	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2838	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2839	0103866	CHIP RESISTOR 82KOHM+-5% 0.1W
R2840	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W

SYMBOL-NO	P-NO	DESCRIPTION
R2841	0103856	CHIP RESISTOR 12KOHM+-5% 0.1W
R2842	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R2843	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R2844	0103870	CHIP RESISTOR 180KOHM+-5% 0.1W
R2845	0103831	CHIP RESISTOR 100 OHM+-5% 0.1W
R2846	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2847	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R2848	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2849	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2876	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R2877	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R2878	0103871	CHIP RESISTOR 220KOHM+-5% 0.1W
R2879	0103839	CHIP RESISTOR 470OHM+-5% 0.1W
R2881	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2882	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R2883	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R2884	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R2885	0103874	CHIP RESISTOR 390KOHM+-5% 0.1W
R2886	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R2887	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R2888	0103872	CHIP RESISTOR 270KOHM+-5% 0.1W
R2889	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2890	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R2891	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R2892	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R2895	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2896	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R2897	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2898	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2899	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2900	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2901	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2902	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R2903	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R2904	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R2905	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2906	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2907	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2908	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R2909	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2911	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R2912	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R2913	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2914	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
RT 001	5040047	TRIMMER 10KOHM
RT 401L	5040044	TRIMMER 1KOHM
RT 401R	5040044	TRIMMER 1KOHM
RT 402L	5040047	TRIMMER 10KOHM
RT 402R	5040047	TRIMMER 10KOHM
RT 403L	5040052	SEMI VARIABLE 220KOHM
RT 403R	5040052	SEMI VARIABLE 220KOHM
RT 404L	5040053	SEMI VARIABLE 470KOHM
RT 404R	5040053	SEMI VARIABLE 470KOHM
RT 405L	5040047	TRIMMER 10KOHM
RT 405R	5040047	TRIMMER 10KOHM
RT 501	5040053	SEMI VARIABLE 470KOHM
RT 502L	5040048	SEMI VARIABLE 22KOHM
RT 502R	5040048	SEMI VARIABLE 22KOHM
RT 503L	5040051	SEMI VARIABLE 100KOHM
RT 503R	5040051	SEMI VARIABLE 100KOHM
RT 504	5040044	TRIMMER 1KOHM
RT 601	5040046	SEMI VARIABLE 4.7KOHM
RT 602	5040052	SEMI VARIABLE 220KOHM
RT 603	5040052	SEMI VARIABLE 220KOHM
RT 605	5040051	SEMI VARIABLE 100KOHM

SYMBOL-NO	P-NO	DESCRIPTION
RT 606	5040031	SEMI VARIABLE 100KOHM
RT 608	5040052	SEMI VARIABLE 220KOHM
RT 609	5040052	SEMI VARIABLE 220KOHM
RT 610	5040053	SEMI VARIABLE 470KOHM
RT 611	5040052	SEMI VARIABLE 220KOHM
RT 612	5040052	SEMI VARIABLE 220KOHM
RT 710	5035047	SEMI VARIABLE 10KOHM
RT 751	5007446	SEMI VARIABLE 4.7KOHM
RT 752	5007446	SEMI VARIABLE 4.7KOHM
RT 753	5007445	SEMI VARIABLE 2.2KOHM
RT 801	5007445	SEMI VARIABLE 2.2KOHM
RT 852	5040044	TRIMMER 1KOHM
RT2103	5040046	SEMI VARIABLE 4.7KOHM
RT2104	5040045	SEMI VARIABLE 2.2KOHM
RT2201	5040046	SEMI VARIABLE 4.7KOHM
RT2202	5040044	TRIMMER 1KOHM
RT2204	5040045	SEMI VARIABLE 2.2KOHM
RT2206	5040043	TRIMMER 470 OHM
RT2207	5040042	SEMI VARIABLE 220 OHM
RT2209	5040043	TRIMMER 470 OHM(ENC)
RT2209V	5040047	TRIMMER 10KOHM(VID)
RT2210	5040046	SEMI VARIABLE 4.7KOHM
RT2211	5040049	SEMI VARIABLE 47KOHM
RT2212	5040043	TRIMMER 470 OHM
RT2213	5040047	TRIMMER 10KOHM
RT2501	5040043	TRIMMER 470 OHM
RT2502	5040043	TRIMMER 470 OHM
RT2503	5040046	SEMI VARIABLE 4.7KOHM
RT2504	5040042	SEMI VARIABLE 220 OHM
RT2505	5040042	SEMI VARIABLE 220 OHM
RT2506	5040044	TRIMMER 1KOHM
RT2507	5040048	SEMI VARIABLE 22KOHM
RT2508	5040048	SEMI VARIABLE 22KOHM
RT2509	5040044	TRIMMER 1KOHM
RT2510	5040046	SEMI VARIABLE 4.7KOHM
RT2511	5040046	SEMI VARIABLE 4.7KOHM
RT2512	5040046	SEMI VARIABLE 4.7KOHM
RT2701	5040048	SEMI VARIABLE 22KOHM
RT2702	5040046	SEMI VARIABLE 4.7KOHM
RT2703	5040048	SEMI VARIABLE 22KOHM
RT2704	5040047	TRIMMER 10KOHM
RT2705	5040047	TRIMMER 10KOHM
RT2706	5040047	TRIMMER 10KOHM
RV 751	5002081	VARIABLE 10KOHM
RV 752	5002081	VARIABLE 10KOHM
RV 753	5002081	VARIABLE 10KOHM
RV 754	5002081	VARIABLE 10KOHM
RV 755	5009131	VARIABLE 500KOHM
RV 756	5009131	VARIABLE 500KOHM
		SEMI-CONDUCTORS
D 001	5380933	LED GL-451
D 201	5328951	DIODE DAN202K
D 202	5328951	DIODE DAN202K
D 401	5328951	DIODE DAN202K
D 402	5328951	DIODE DAN202K
D 403	5328951	DIODE DAN202K
D 410	5328951	DIODE DAN202K
D 411	5328951	DIODE DAN202K
D 501	5328951	DIODE DAN202K
D 502	5328951	DIODE DAN202K
D 603	5328302	DIODE MA151WA(MN)
D 606	5328951	DIODE DAN202K
D 607	5328951	DIODE DAN202K

SYMBOL-NO	P-NO	DESCRIPTION
D 608	5328951	DIODE DAN202K
D 609	5328951	DIODE DAN202K
D 610	5328951	DIODE DAN202K
D 611	5328381	DIODE MA153(MC)
D 612	5328951	DIODE DAN202K
D 613	5328951	DIODE DAN202K
D 614	5328951	DIODE DAN202K
D 615	5328951	DIODE DAN202K
D 616	5328951	DIODE DAN202K
D 617	5328951	DIODE DAN202K
D 618	5328951	DIODE DAN202K
D 620	5328951	DIODE DAN202K
D 621	5328951	DIODE DAN202K
D 622	5332781	DIODE 1SS254
D 623	5332781	DIODE 1SS254
D 751	5337221	DIODE HSM198S
D 752	5337221	DIODE HSM198S
D 753	5328951	DIODE DAN202K
D 755	5328951	DIODE DAN202K
D 756	5328951	DIODE DAN202K
D 757	5328951	DIODE DAN202K
D 758	5328951	DIODE DAN202K
D 759	5328951	DIODE DAN202K
D 760	5328951	DIODE DAN202K
D 762	5328951	DIODE DAN202K
D 763	5328951	DIODE DAN202K
D 764	5328951	DIODE DAN202K
D 765	5328951	DIODE DAN202K
D 803	5328951	DIODE DAN202K
D 804	5328951	DIODE DAN202K
D 852	5328951	DIODE DAN202K
D 901	5328951	DIODE DAN202K
D 902	5328951	DIODE DAN202K
D 903	5328951	DIODE DAN202K
D 904	5328951	DIODE DAN202K
D 906	5328951	DIODE DAN202K
D 907	5328951	DIODE DAN202K
D 908	5328302	DIODE MA151WA(MN)
D 909	5328302	DIODE MA151WA(MN)
D 911	5328951	DIODE DAN202K
D 912	5328951	DIODE DAN202K
D 913	5328951	DIODE DAN202K
D 915	5332781	DIODE 1SS254
D 916	5332781	DIODE 1SS254
D1601	5328303	DIODE MA152WK (MU)
D1602	5328303	DIODE MA152WK (MU)
D1603	5328303	DIODE MA152WK (MU)
D1851	5333343	DIODE EK14
D1852	5333343	DIODE EK14
D1951	5328951	DIODE DAN202K
D1952	5328951	DIODE DAN202K
D1953	5328951	DIODE DAN202K
D1954	5328951	DIODE DAN202K
D2101	5328951	DIODE DAN202K
D2102	5328951	DIODE DAN202K
D2201	5328951	DIODE DAN202K
D2202	5328951	DIODE DAN202K
D2601	5328301	DIODE MA151WK (MT)(SPF)
D2601P	5328951	DIODE DAN202K (PBK)
D2602	5328301	DIODE MA151WK (MT)(SPF)
D2602P	5328951	DIODE DAN202K (PBK)
D2603	5328951	DIODE DAN202K
D2604	5328951	DIODE DAN202K
D2701	5328951	DIODE DAN202K
D2702	5328951	DIODE DAN202K

SYMBOL-NO	P-NO	DESCRIPTION
D2703	5328951	DIODE DAN202K
D2704	5328951	DIODE DAN202K
D2705	5337031	DIODE 1SV201
D2706	5328951	DIODE DAN202K
D2707	5337031	DIODE 1SV201
D2708	5328951	DIODE DAN202K
D2709	5332781	DIODE 1SS254
HIC2201	1371124	IC HT4921C
HIC2202	1371124	IC HT4921C
IC 001	5391282	IC DN6851
IC 002	5391282	IC DN6851
IC 201	5305241	IC SN74HC00NS
IC 202	5304961	IC HA118059FP
IC 203	5304961	IC HA118059FP
IC 204	5305832	IC SC7S08F
IC 205	5305832	IC SC7S08F
IC 401L	1341472	IC LA7297
IC 401R	1341472	IC LA7297
IC 402	1350401	IC NJM2234M
IC 403	1350401	IC NJM2234M
IC 404	5364831	IC BA4558F
IC 405	1351341	IC NJM2043M-D
IC 406	5364831	IC BA4558F
IC 407	5364831	IC BA4558F
IC 421	1341212	IC CXA1101P
IC 451	5364831	IC BA4558F
IC 501	5304081	IC HA12115MP
IC 502	1360121	IC HA12150NT
IC 503	1361101	IC HA12121NT
IC 601	1350441	IC HD49721A
IC 602	1341421	IC LA7116
IC 603	5300821	IC M54874P
IC 604	5363182	IC MPC358G
IC 605	5361551	IC UPD4030BG
IC 606	5367831	IC M51486L
IC 607	5367961	IC BA2254F
IC 609	5362091	IC UPD4538BG
IC 610	5367961	IC BA2254F
IC 611	1350401	IC NJM2234M
IC 613	1378661	PWB ASSY P.GEN.(HTS7166)
IC 615	5305832	IC SC7S08F
IC 616	5305821	IC TC7S32
IC 617	5305832	IC SC7S08F
IC 618	1350791	IC TC4S66F
IC 619	5305811	IC TC7S04F
IC 701	5352721	IC NJM2903
IC 751	5306991	IC UPD75P308GF
IC 752	1353351	IC UPD74HC4094FP
IC 753	1350322	IC 8054ALB
IC 754	1351081	IC AN6558S
IC 755	5352722	IC LM2903M
IC 801	1378634	PWB ASSY SW.REG.(HTS7163C)
IC 802	1378642	PWB ASSY C.DRI.(HTS7164A)
IC 803	1351331	IC LP2951CM
IC 901	1353821	IC HD4074019FP
IC 903	5300795	IC XRA6209U4
IC 904	5352722	IC LM2903M
IC 905	5352722	IC LM2903M
IC 906	1350322	IC 8054ALB
IC 907	5364601	IC M5278L05
IC 908	5305791	IC NJU74HC00M
IC 909	1353351	IC UPD74HC4094FP
IC 910	5305791	IC NJU74HC00M
IC 911	5305832	IC SC7S08F
IC 912	1353321	IC SC7S00F

SYMBOL-NO	P-NO	DESCRIPTION
IC 913	5305832	IC SC7S08F
IC 914	5364601	IC M5278L05
IC1601	1341941	IC LB1684H
IC1602	5366631	IC BA6303F
IC1603	5363182	IC MPC358G
IC1604	5363182	IC MPC358G
IC1605	5368221	IC UPD4012BG
IC1606	5368231	IC UPD4013BG
IC1607	5368231	IC UPD4013BG
IC1608	5368241	IC UPD4093BG
IC1609	5363182	IC MPC358G
IC1610	5361311	IC UPD4066BG
IC1612	5363182	IC MPC358G
IC1951	1353381	IC UPD71051GB-3B4
IC1952	1350322	IC 8054ALB
IC1953	1353341	IC NJU74HCU04M
IC1954	1353481	IC HD74HC393FP
IC1955	5352722	IC LM2903M
IC1956	5305791	IC NJU74HC00M
IC2104	1350221	IC MSM6856MS
IC2105	1350211	IC NJM2240M
IC2106	5304961	IC HA118059FP
IC2107	1351121	IC HA118104FP
IC2201	1360421	IC HA118019NT
IC2202	5304241	IC VC2031MP
IC2203	1350031	IC HA118066MP
IC2204	1350091	IC HA118084MP
IC2205	5304241	IC VC2031MP
IC2206	1350201	IC MSM6966MS
IC2207	1350191	IC NJM2238M
IC2208	1350031	IC HA118066MP
IC2209	5305062	IC RC74HC04M
IC2210	5305062	IC RC74HC04M
IC2501	5304961	IC HA118059FP
IC2502	1351121	IC HA118104FP
IC2503	5304961	IC HA118059FP
IC2504	5352731	IC HA11720MP
IC2601	5368231	IC UPD4013BG(SPF)
IC2601P	1378652	PWB ASSY V.SYNC.(HTS7165A)(PBK)
IC2602	5305832	IC SC7S08F(SPF)
IC2602P	5355401	IC MSM6205GS(PBK)
IC2603	5352722	IC LM2903M(SPF)
IC2603P	5367961	IC BA2254F(PBK)
IC2604	5368231	IC UPD4013BG
IC2605	1353251	IC SN74HC164NS
IC2606	1353341	IC NJU74HCU04M
IC2607	5367961	IC BA2254F
IC2701	1350661	IC HA19211MP
IC2702	1353312	IC HG62E58R29FS
IC2703	1344151	IC HM63021P-34A
IC2704	1344151	IC HM63021P-34A
IC2705	5304011	IC HA11532MP
IC2706	5361611	IC TC74HC4066F
IC2707	1350661	IC HA19211MP
IC2708	5301461	IC HM53461ZP-12
IC2709	5301461	IC HM53461ZP-12
IC2710	1353301	IC HG62E43R24FS
IC2711	1344151	IC HM63021P-34A
IC2712	1344141	IC HD49304NT
IC2713	1351131	IC MB47082PF-G-BND
IC2714	1351131	IC MB47082PF-G-BND
IC2715	1354001	IC HD74HC4538FP
IC2716	5355401	IC MSM6205GS
IC2717	5369491	IC TC4066BF
IC2718	1351131	IC MB47082PF-G-BND

SYMBOL-NO	P-NO	DESCRIPTION
IC2719	5305811	IC TC7S04F
IC2720	5305241	IC SN74HC00NS
IC2721	5364831	IC BA4558F
IC2722	5364831	IC BA4558F
IC2723	5364831	IC BA4558F
IC2724	5361611	IC TC74HC4066F
IC2725	5364541	IC MB74LS221PF
IC2726	5364541	IC MB74LS221PF
IC2727	5364541	IC MB74LS221PF
IC2728	5305062	IC RC74HC04M
IC2729	5305062	IC RC74HC04M
IC2730	1353341	IC NJU74HCU04M
IC2732	5305811	IC TC7S04F
IC2733	5305811	IC TC7S04F
IC2735	5305901	IC HD74HC02FP
IC2736	5305841	IC HD74HC10
IC2737	5305241	IC SN74HC00NS
IC2742	5305062	IC RC74HC04M
IC2743	1353991	IC TC4S30F
IC2744	1353511	IC HD74HC08FP
IC2748	5305832	IC SC7S08F
IC2749	5305811	IC TC7S04F
IC2750	5305832	IC SC7S08F
IC2752	5305822	IC SN7S32F
LC 751	5316341	LCD
LD 751	5381211	LED SEL-2213C
LD 751	5381211	LED SEL-2213C
LD 752	5381211	LED SEL-2213C
LD 752	5381211	LED SEL-2213C
LD 753	5381211	LED SEL-2213C
LD 753	5381211	LED SEL-2213C
LD 754	5381211	LED SEL-2213C
LD 754	5381214	LED SEL2413E
LD 755	5381211	LED SEL-2213C
LD 755	5381214	LED SEL2413E
LD 756	5381211	LED SEL-2213C
LD 756	5381211	LED SEL-2213C
Q 001	5324661	TRANSISTOR PT-483F1
Q 002	5324661	TRANSISTOR PT-483F1
Q 201	5326811	TRANSISTOR 2SB1001
Q 202	5326811	TRANSISTOR 2SB1001
Q 203	5326811	TRANSISTOR 2SB1001
Q 204	5328793	TRANSISTOR DTC144K-26
Q 205	5328793	TRANSISTOR DTC144K-26
Q 206	1323151	TRANSISTOR 2SB1182(R,D)
Q 207	1323151	TRANSISTOR 2SB1182(R,D)
Q 209	1323151	TRANSISTOR 2SB1182(R,D)
Q 210	5326101	TRANSISTOR FMW1
Q 211	5326101	TRANSISTOR FMW1
Q 213	5326101	TRANSISTOR FMW1
Q 214	5328971	TRANSISTOR 2SC2412KBRST
Q 215	5328795	TRANSISTOR DTA144EK-16
Q 216	5328961	TRANSISTOR 2SA1037KERS
Q 217	5328971	TRANSISTOR 2SC2412KBRST
Q 218	5328961	TRANSISTOR 2SA1037KERS
Q 219	5328201	TRANSISTOR 2SC2618(RC)
Q 220	5326811	TRANSISTOR 2SB1001
Q 221	5328793	TRANSISTOR DTC144K-26
Q 222	5328793	TRANSISTOR DTC144K-26
Q 225	5328793	TRANSISTOR DTC144K-26
Q 401L	5328791	TRANSISTOR DTC124K(25)
Q 401R	5328791	TRANSISTOR DTC124K(25)
Q 402	5328791	TRANSISTOR DTC124K(25)
Q 403	5328791	TRANSISTOR DTC124K(25)
Q 404	5328791	TRANSISTOR DTC124K(25)

SYMBOL-NO	P-NO	DESCRIPTION
Q 405	5328795	TRANSISTOR DTA144EK-16
Q 406	5328973	TRANSISTOR 2SC2412K-BST
Q 407	5328791	TRANSISTOR DTC124K(25)
Q 408L	5328973	TRANSISTOR 2SC2412K-BST
Q 408R	5328973	TRANSISTOR 2SC2412K-BST
Q 409	5328795	TRANSISTOR DTA144EK-16
Q 410	5328791	TRANSISTOR DTC124K(25)
Q 412	5328791	TRANSISTOR DTC124K(25)
Q 413L	5326691	TRNSISTOR FMW3
Q 413R	5326691	TRNSISTOR FMW3
Q 415L	5328795	TRANSISTOR DTA144EK-16
Q 415R	5328795	TRANSISTOR DTA144EK-16
Q 416	5328795	TRANSISTOR DTA144EK-16
Q 417	5328791	TRANSISTOR DTC124K(25)
Q 418	5328795	TRANSISTOR DTA144EK-16
Q 419	5328791	TRANSISTOR DTC124K(25)
Q 420	5328795	TRANSISTOR DTA144EK-16
Q 421	5328791	TRANSISTOR DTC124K(25)
Q 422	5328791	TRANSISTOR DTC124K(25)
Q 423	5328793	TRANSISTOR DTC144K-26
Q 424L	5328791	TRANSISTOR DTC124K(25)
Q 424R	5328791	TRANSISTOR DTC124K(25)
Q 425L	5328791	TRANSISTOR DTC124K(25)
Q 425R	5328791	TRANSISTOR DTC124K(25)
Q 431	5328793	TRANSISTOR DTC144K-26
Q 432	5328793	TRANSISTOR DTC144K-26
Q 433	1323081	TRANSISTOR 2SA1036K
Q 451	5328795	TRANSISTOR DTA144EK-16
Q 452	1323081	TRANSISTOR 2SA1036K
Q 453	5328793	TRANSISTOR DTC144K-26
Q 477	5328795	TRANSISTOR DTA144EK-16
Q 478	5328973	TRANSISTOR 2SC2412K-BST
Q 479	5326111	TRANSISTOR 2SD874-ZR
Q 501	1323081	TRANSISTOR 2SA1036K
Q 502	1323081	TRANSISTOR 2SA1036K
Q 503	5328791	TRANSISTOR DTC124K(25)
Q 504	1323081	TRANSISTOR 2SA1036K
Q 505	5328791	TRANSISTOR DTC124K(25)
Q 506L	5328973	TRANSISTOR 2SC2412K-BST
Q 506R	5328973	TRANSISTOR 2SC2412K-BST
Q 508	5328973	TRANSISTOR 2SC2412K-BST
Q 509L	5328973	TRANSISTOR 2SC2412K-BST
Q 509R	5328973	TRANSISTOR 2SC2412K-BST
Q 510	5328791	TRANSISTOR DTC124K(25)
Q 511	5328791	TRANSISTOR DTC124K(25)
Q 601	5328793	TRANSISTOR DTC144K-26
Q 602	5328793	TRANSISTOR DTC144K-26
Q 605	5328795	TRANSISTOR DTA144EK-16
Q 606	5328793	TRANSISTOR DTC144K-26
Q 608	5328793	TRANSISTOR DTC144K-26
Q 610	5328793	TRANSISTOR DTC144K-26
Q 611	5328793	TRANSISTOR DTC144K-26
Q 612	5328793	TRANSISTOR DTC144K-26
Q 613	5328793	TRANSISTOR DTC144K-26
Q 616	5328793	TRANSISTOR DTC144K-26
Q 617	5328793	TRANSISTOR DTC144K-26
Q 618	5328795	TRANSISTOR DTA144EK-16
Q 619	5328793	TRANSISTOR DTC144K-26
Q 620	5326206	TRANSISTOR FMC2
Q 621	5326206	TRANSISTOR FMC2
Q 623	5326541	TRANSISTOR IMH2
Q 624	5326104	TRANSISTOR FMS2
Q 701	5328335	TRANSISTOR 2SB709A-RS-T
Q 702	5328793	TRANSISTOR DTC144K-26
Q 705	5328793	TRANSISTOR DTC144K-26

SYMBOL-NO	P-NO	DESCRIPTION
Q 751	5328973	TRANSISTOR 2SC2412K-BST
Q 752	5328793	TRANSISTOR DTC144K-26
Q 753	5328973	TRANSISTOR 2SC2412K-BST
Q 755	5328973	TRANSISTOR 2SC2412K-BST
Q 756	5328973	TRANSISTOR 2SC2412K-BST
Q 757	5328973	TRANSISTOR 2SC2412K-BST
Q 758	5328973	TRANSISTOR 2SC2412K-BST
Q 759	5328973	TRANSISTOR 2SC2412K-BST
Q 760	5328973	TRANSISTOR 2SC2412K-BST
Q 761	5328973	TRANSISTOR 2SC2412K-BST
Q 762	5328973	TRANSISTOR 2SC2412K-BST
Q 763	5328973	TRANSISTOR 2SC2412K-BST
Q 764	5328631	TRANSISTOR 2SD1306ND-E MICRO PACKAGE
Q 765	5328631	TRANSISTOR 2SD1306ND-E MICRO PACKAGE
Q 766	5328793	TRANSISTOR DTC144K-26
Q 767	5328793	TRANSISTOR DTC144K-26
Q 768	5328973	TRANSISTOR 2SC2412K-BST
Q 769	5323961	TRANSISTOR DTC124ES
Q 803	1323081	TRANSISTOR 2SA1036K
Q 853	5326811	TRANSISTOR 2SB1001
Q 854	5326101	TRANSISTOR FMW1
Q 855	5326811	TRANSISTOR 2SB1001
Q 856	5326101	TRANSISTOR FMW1
Q 857	1323081	TRANSISTOR 2SA1036K
Q 861	5326206	TRANSISTOR FMC2
Q 862	5326206	TRANSISTOR FMC2
Q 863	5326101	TRANSISTOR FMW1
Q 902	5328793	TRANSISTOR DTC144K-26
Q 903	5328795	TRANSISTOR DTA144EK-16
Q 904	5328795	TRANSISTOR DTA144EK-16
Q 905	5328795	TRANSISTOR DTA144EK-16
Q 906	5326811	TRANSISTOR 2SB1001
Q 907	5326101	TRANSISTOR FMW1
Q 910	5326101	TRANSISTOR FMW1
Q 911	5328795	TRANSISTOR DTA144EK-16
Q 912	5326811	TRANSISTOR 2SB1001
Q 913	5328793	TRANSISTOR DTC144K-26
Q 915	5328793	TRANSISTOR DTC144K-26
Q 918	5328963	TRANSISTOR 2SA1037K-FS
Q 919	5328793	TRANSISTOR DTC144K-26
Q 920	5328793	TRANSISTOR DTC144K-26
Q 921	5328963	TRANSISTOR 2SA1037K-FS
Q 922	5328973	TRANSISTOR 2SC2412K-BST
Q 923	5328793	TRANSISTOR DTC144K-26
Q 924	5328963	TRANSISTOR 2SA1037K-FS
Q 927	5328793	TRANSISTOR DTC144K-26
Q1601	5326104	TRANSISTOR FMS2
Q1602	5328971	TRANSISTOR 2SC2412KBRST
Q1603	5328793	TRANSISTOR DTC144K-26
Q1604	5328793	TRANSISTOR DTC144K-26
Q1605	5326102	TRANSISTOR FMW2
Q1606	5326104	TRANSISTOR FMS2
Q1608	5326101	TRANSISTOR FMW1
Q1609	5328793	TRANSISTOR DTC144K-26
Q1610	5328793	TRANSISTOR DTC144K-26
Q1612	5323461	TRANSISTOR 2SD1266PQ
Q1613	5328971	TRANSISTOR 2SC2412KBRST
Q1614	5326206	TRANSISTOR FMC2
Q1615	5328793	TRANSISTOR DTC144K-26
Q1616	5328793	TRANSISTOR DTC144K-26
Q1617	5328793	TRANSISTOR DTC144K-26
Q1618	5328793	TRANSISTOR DTC144K-26
Q1951	5328963	TRANSISTOR 2SA1037K-FS
Q1952	5328973	TRANSISTOR 2SC2412K-BST
Q1953	1323081	TRANSISTOR 2SA1036K

SYMBOL-NO	P-NO	DESCRIPTION
Q1955	5328973	TRANSISTOR 2SC2412K-BST
Q1956	1323081	TRANSISTOR 2SA1036K
Q2001	5328793	TRANSISTOR DTC144K-26
Q2002	5328061	TRANSISTOR 2SA812(M56) MICRO PACKAGE
Q2003	1323081	TRANSISTOR 2SA1036K
Q2004	5328793	TRANSISTOR DTC144K-26
Q2101	5328962	TRANSISTOR 2SA1037K
Q2108	5328972	TRANSISTOR 2SC2412K-BRT
Q2109	5328972	TRANSISTOR 2SC2412K-BRT
Q2110	5328972	TRANSISTOR 2SC2412K-BRT
Q2111	5326492	TRANSISTOR IMX2
Q2112	5328972	TRANSISTOR 2SC2412K-BRT
Q2113	5328962	TRANSISTOR 2SA1037K
Q2114	5328962	TRANSISTOR 2SA1037K
Q2115	5326031	TRANSISTOR 2SC2735
Q2116	5326031	TRANSISTOR 2SC2735
Q2117	5326031	TRANSISTOR 2SC2735
Q2118	5326031	TRANSISTOR 2SC2735
Q2119	5328972	TRANSISTOR 2SC2412K-BRT
Q2120	5328972	TRANSISTOR 2SC2412K-BRT
Q2121	5328972	TRANSISTOR 2SC2412K-BRT
Q2201	5328962	TRANSISTOR 2SA1037K
Q2202	5328972	TRANSISTOR 2SC2412K-BRT
Q2203	5328962	TRANSISTOR 2SA1037K
Q2204	5328795	TRANSISTOR DTA144EK-16
Q2205	5328793	TRANSISTOR DTC144K-26
Q2206	5328972	TRANSISTOR 2SC2412K-BRT
Q2207	5328972	TRANSISTOR 2SC2412K-BRT
Q2208	5328972	TRANSISTOR 2SC2412K-BRT
Q2209	5328972	TRANSISTOR 2SC2412K-BRT
Q2210	5326031	TRANSISTOR 2SC2735
Q2211	5326031	TRANSISTOR 2SC2735
Q2212	5328962	TRANSISTOR 2SA1037K
Q2213	5326031	TRANSISTOR 2SC2735
Q2214	5328972	TRANSISTOR 2SC2412K-BRT
Q2215	5328972	TRANSISTOR 2SC2412K-BRT
Q2216	5328962	TRANSISTOR 2SA1037K
Q2217	5328972	TRANSISTOR 2SC2412K-BRT
Q2218	5328972	TRANSISTOR 2SC2412K-BRT
Q2219	5328972	TRANSISTOR 2SC2412K-BRT
Q2220	5326881	TRANSISTOR 2SC3016
Q2221	5326881	TRANSISTOR 2SC3016
Q2222	5328972	TRANSISTOR 2SC2412K-BRT
Q2223	5326881	TRANSISTOR 2SC3016
Q2224	5326881	TRANSISTOR 2SC3016
Q2225	5328972	TRANSISTOR 2SC2412K-BRT
Q2228	5328795	TRANSISTOR DTA144EK-16
Q2229	5328793	TRANSISTOR DTC144K-26
Q2232	5328972	TRANSISTOR 2SC2412K-BRT
Q2233	5328962	TRANSISTOR 2SA1037K
Q2234	5328972	TRANSISTOR 2SC2412K-BRT
Q2235	5328962	TRANSISTOR 2SA1037K
Q2236	5328972	TRANSISTOR 2SC2412K-BRT
Q2237	5328971	TRANSISTOR 2SC2412KBRST
Q2238	5328962	TRANSISTOR 2SA1037K
Q2239	5328972	TRANSISTOR 2SC2412K-BRT
Q2240	5328971	TRANSISTOR 2SC2412KBRST
Q2241	5328793	TRANSISTOR DTC144K-26
Q2242	5328972	TRANSISTOR 2SC2412K-BRT
Q2243	5328962	TRANSISTOR 2SA1037K
Q2244	5328972	TRANSISTOR 2SC2412K-BRT
Q2245	5328972	TRANSISTOR 2SC2412K-BRT(VID)
Q2245E	5328972	TRANSISTOR 2SC2412K-BRT(ENC)
Q2246	5328972	TRANSISTOR 2SC2412K-BRT
Q2247	5328795	TRANSISTOR DTA144EK-16

SYMBOL-NO	P-NO	DESCRIPTION
Q2248	5328962	TRANSISTOR 2SA1037K
Q2249	5328972	TRANSISTOR 2SC2412K-BRT
Q2250	5328972	TRANSISTOR 2SC2412K-BRT
Q2251	5328793	TRANSISTOR DTC144K-26
Q2252	5328972	TRANSISTOR 2SC2412K-BRT
Q2253	5328795	TRANSISTOR DTA144EK-16
Q2254	5328793	TRANSISTOR DTC144K-26
Q2255	5328793	TRANSISTOR DTC144K-26
Q2256	5328795	TRANSISTOR DTA144EK-16
Q2257	5328972	TRANSISTOR 2SC2412K-BRT
Q2258	5326206	TRANSISTOR FMC2(VID)
Q2258E	5328962	TRANSISTOR 2SA1037K(ENC)
Q2259	5328793	TRANSISTOR DTC144K-26
Q2501	5328972	TRANSISTOR 2SC2412K-BRT
Q2502	5328962	TRANSISTOR 2SA1037K
Q2503	5326101	TRANSISTOR FMW1
Q2504	5328972	TRANSISTOR 2SC2412K-BRT
Q2505	5326104	TRANSISTOR FMS2
Q2506	5328972	TRANSISTOR 2SC2412K-BRT
Q2507	5328972	TRANSISTOR 2SC2412K-BRT
Q2508	5328972	TRANSISTOR 2SC2412K-BRT
Q2509	5326704	TRANSISTIR IMT2
Q2510	5328972	TRANSISTOR 2SC2412K-BRT
Q2511	5328972	TRANSISTOR 2SC2412K-BRT
Q2512	5328972	TRANSISTOR 2SC2412K-BRT
Q2513	5328971	TRANSISTOR 2SC2412KBRST
Q2514	5328972	TRANSISTOR 2SC2412K-BRT
Q2515	5328972	TRANSISTOR 2SC2412K-BRT
Q2516	5328972	TRANSISTOR 2SC2412K-BRT
Q2517	5328972	TRANSISTOR 2SC2412K-BRT
Q2518	5328972	TRANSISTOR 2SC2412K-BRT
Q2519	5328972	TRANSISTOR 2SC2412K-BRT
Q2520	5328795	TRANSISTOR DTA144EK-16
Q2521	5328962	TRANSISTOR 2SA1037K
Q2601	5328793	TRANSISTOR DTC144K-26
Q2602	5328793	TRANSISTOR DTC144K-26
Q2701	5328972	TRANSISTOR 2SC2412K-BRT
Q2702	5328962	TRANSISTOR 2SA1037K
Q2703	5328972	TRANSISTOR 2SC2412K-BRT
Q2704	5326941	TRANSISTOR 2SK323
Q2705	5328201	TRANSISTOR 2SC2618(RC)
Q2706	5328211	TRANSISTOR 2SA1121C(SC)
Q2707	5328972	TRANSISTOR 2SC2412K-BRT
Q2708	5328972	TRANSISTOR 2SC2412K-BRT
Q2709	5326941	TRANSISTOR 2SK323
Q2710	5328962	TRANSISTOR 2SA1037K
Q2711	5328972	TRANSISTOR 2SC2412K-BRT
Q2712	5328972	TRANSISTOR 2SC2412K-BRT
Q2713	5328972	TRANSISTOR 2SC2412K-BRT
Q2714	5326941	TRANSISTOR 2SK323
Q2715	5328972	TRANSISTOR 2SC2412K-BRT
Q2716	5328962	TRANSISTOR 2SA1037K
Q2717	5328962	TRANSISTOR 2SA1037K
Q2718	5328972	TRANSISTOR 2SC2412K-BRT
Q2719	5328962	TRANSISTOR 2SA1037K
Q2720	5328972	TRANSISTOR 2SC2412K-BRT
Q2721	5328972	TRANSISTOR 2SC2412K-BRT
Q2722	5328962	TRANSISTOR 2SA1037K
Q2723	5328972	TRANSISTOR 2SC2412K-BRT
Q2724	5326104	TRANSISTOR FMS2
Q2725	5328793	TRANSISTOR DTC144K-26
Q2726	5328793	TRANSISTOR DTC144K-26
Q2727	5326104	TRANSISTOR FMS2
Q2728	5326941	TRANSISTOR 2SK323
Q2729	5326951	TRANSISTOR 2SC2734

SYMBOL-NO	P-NO	DESCRIPTION
Q2730	5326951	TRANSISTOR 2SC2734
Q2731	5326104	TRANSISTOR FMS2
Q2732	5328793	TRANSISTOR DTC144K-26
Q2733	5328793	TRANSISTOR DTC144K-26
Q2734	5326104	TRANSISTOR FMS2
Q2735	5326941	TRANSISTOR 2SK323
Q2736	5326951	TRANSISTOR 2SC2734
Q2737	5326951	TRANSISTOR 2SC2734
Q2738	5328793	TRANSISTOR DTC144K-26
Q2739	5328793	TRANSISTOR DTC144K-26
Q2740	5328793	TRANSISTOR DTC144K-26
Q2741	5328962	TRANSISTOR 2SA1037K
Q2742	5328962	TRANSISTOR 2SA1037K
Q2743	5328962	TRANSISTOR 2SA1037K
Q2744	5328971	TRANSISTOR 2SC2412KBRST
Q2745	5328962	TRANSISTOR 2SA1037K
Q2746	5328962	TRANSISTOR 2SA1037K
Q2901	5328972	TRANSISTOR 2SC2412K-BRT
Q2902	5328972	TRANSISTOR 2SC2412K-BRT
QF 851	5721804	IC PROTECTER
QF 852	5721804	IC PROTECTER
ZD 751	5337241	DIODE MA3062M
ZD 752	5330317	DIODE HZ-7A-1 ZENNER
ZD 803	5332095	DIODE RD47E
ZD 851	5337014	DIODE MA3082M
ZD 852	5337011	DIODE MA3075L
ZD 901	5337014	DIODE MA3082M
ZD 902	5337241	DIODE MA3062M
ZD 903	5328663	DIODE MA3068T
ZD1601	5337241	DIODE MA3062M

TRANSFORMER

T 851	5214391	TRANSFORMER,POWER

COILS

L 201	5159096	COIL,CHOKE 100UH+-10%
L 202	5159096	COIL,CHOKE 100UH+-10%
L 401L	5152623	CHOKE COIL 15000UH
L 401R	5152623	CHOKE COIL 15000UH
L 402	5159174	COIL 100UH
L 405	5152628	COIL,CHOKE
L 421L	5163022	LOW PASS FILTER
L 421R	5163022	LOW PASS FILTER
L 451	5159174	COIL 100UH
L 465	5159174	COIL 100UH
L 477	5159096	COIL,CHOKE 100UH+-10%
L 478	5159096	COIL,CHOKE 100UH+-10%
L 501	5159174	COIL 100UH
L 502	5159174	COIL 100UH
L 503	5159174	COIL 100UH
L 504	5159174	COIL 100UH
L 505	5159174	COIL 100UH
L 510L	5159253	CHOKE COIL 39UH
L 510R	5159249	CHOKE COIL 22UH+-10%
L 751	5159231	COIL 100UH+-10%
L 801	5220342	COIL 22UH
L 804	5220342	COIL 22UH
L 851	5153143	COIL 22UH
L 852	5220343	COIL 150UH
L 853	5159096	COIL,CHOKE 100UH+-10%
L2001	5159232	COIL 12UH+-10%
L2002	5159097	COIL,CHOKE
L2108	5159231	COIL 100UH+-10%

SYMBOL-NO	P-NO	DESCRIPTION
L2204	5159257	CHOKE COIL 220UH
L2206	5159176	COIL,390UH
L2207	5159227	COIL 56UH
L2209	5159235	COIL,CHOKE 8.2UH
L2210	5159253	CHOKE COIL 39UH
L2211	5159232	COIL 12UH+-10%
L2212	5159231	COIL 100UH+-10%
L2213	5159249	CHOKE COIL 22UH+-10%
L2214	5159226	FILTER
L2215	5159226	FILTER
L2216	5159248	CHOKE COIL 18UH
L2217	5159252	CHOKE COIL 33UH
L2218	5159229	COIL 68UH
L2220	5159253	CHOKE COIL 39UH
L2221	5159227	COIL 56UH
L2229	5159247	CHOKE COIL 15UH+-10%
L2233	5159092	COIL 220UH+-10%
L2234	5159099	CHOKE COIL 820UH
L2236	5159232	COIL 12UH+-10%
L2239	5159257	CHOKE COIL 220UH
L2240	5159232	COIL 12UH+-10%
L2241	5159099	CHOKE COIL 820UH
L2242	5159228	COIL 82UH(VID)
L2242E	5124312	COIL 15UH(ENC)
L2243	5159255	COIL 150UH+-10%
L2508	5159226	FILTER
L2510	5159246	CHOKE COIL 10UH+-10%
L2511	5159155	CHOKE COIL 120UH+-10%
L2701	5159252	CHOKE COIL 33UH
L2706	5159252	CHOKE COIL 33UH
L2707	5159252	CHOKE COIL 33UH
L2719	5159231	COIL 100UH+-10%
L2722	5159231	COIL 100UH+-10%
L2723	5159231	COIL 100UH+-10%
L2725	5130621	COIL

CRYSTALS

X 752	5784951	CRYSTAL
X 901	5784471	OSCILLATOR
X1951	5784961	CRYSTAL
X2201	5784982	CRYSTAL
X2202	5784982	CRYSTAL
X2601	5781621	CRYSTAL
X2702	5781781	CRYSTAL

MISCELLANEOUS

CN 742	5819651	MINI CONNECTOR
CP 501	5163101	BAND PASS FILTER
CP 502	5163102	BAND PASS FILTER
CP2101	5163892	FILTER
CP2102	5163833	FILTER,LOW PASS
CP2103	5163901	FILTER
CP2104	5163562	FILTER,LOW PASS
CP2201	5163883	DELAY LINE
CP2202	5165001	FILTER,LOW PASS
CP2203	5163423	DELAY LINE
CP2204	5163422	FILTER,LOW PASS
CP2206	5163753	DELAY LINE
CP2207	5163281	BAND PASS FILTER
CP2208	5165001	FILTER,LOW PASS
CP2209	5163883	DELAY LINE
CP2210	5163422	FILTER,LOW PASS
CP2211	5163423	DELAY LINE

SYMBOL-NO	P-NO	DESCRIPTION
CP2215	5169024	LOW PASS FILTER
CP2216	5163231	FILTER
CP2217	5163281	BAND PASS FILTER
DL 201	5785953	DELAY LINE
EL2001	5172402	CORE
EL2002	5172402	CORE
EL2003	5172402	CORE
EL2004	5172402	CORE
EL2701	5172402	CORE
EL2702	5172402	CORE
EL2703	5172402	CORE
EL2704	5172402	CORE
EL2705	5172402	CORE
EL2706	5172402	CORE
EL2707	5172402	CORE
EL2708	5172402	CORE
EL2709	5172402	CORE
EL2710	5172402	CORE
EL2711	5172402	CORE
⚠FU 801	5721983	FUSE 3A
⚠FU 802	5721982	FUSE 2A
⚠FU1601	5791901	TIMER
J1703	5695051	JACK,CAMERA
J1705	5695021	JACK,REMOTE
J1706	5693541	JACK,DC
MT 741	5553221	METER,LEVEL
MT 742	5553221	METER,LEVEL
OSC 401	5261371	OSC BLOCK
OSC 402	5261371	OSC BLOCK
PG1615	5692032	MINI PLUG
PG2012	5666576	PLUG
PG2064	5666157	PLUG
PG2065	5661714	MINI PLUG
RL 401	5640591	RELAY
RL 402	5640591	RELAY
S 401	5621591	SWITCH
S 701	5622652	SLIDE SWITCH
S 751	5634581	SWITCH
S 752	5634584	SWITCH
S 753	5634584	SWITCH
S 754	5634581	SWITCH
S 755	5634584	SWITCH
S 756	5634584	SWITCH
S 757	5634584	SWITCH
S 758	5634581	SWITCH
S 759	5634584	SWITCH
S 760	5621601	SWITCH
S 761	5633911	SWITCH
S 762	5633911	SWITCH
S 763	5633911	SWITCH
S 764	5633911	SWITCH
S 765	5622801	SWITCH
S 766	5622801	SWITCH
S 767	5622801	SWITCH
S 768	5633911	SWITCH
S 769	5633911	SWITCH
S1951	5622652	SLIDE SWITCH
SW 001	5635321	SWITCH
SW 002	5635331	SWITCH
SW 701	5635031	PUSH SWITCH
TH 206	5340366	THERMISTOR ERT-D3FHL203G
TH2101	5340363	THERMISTOR ERTD2FHL
TH2202	5340363	THERMISTOR ERTD2FHL
TH2203	5340361	THERMISTOR ERTD2FHL
TH2204	5340361	THERMISTOR ERTD2FHL
TH2701	5340366	THERMISTOR ERT-D3FHL203G
TH2702	5340366	THERMISTOR ERT-D3FHL203G
TH2704	5340366	THERMISTOR ERT-D3FHL203G

MECHANICAL PARTS LIST (VL-S100)

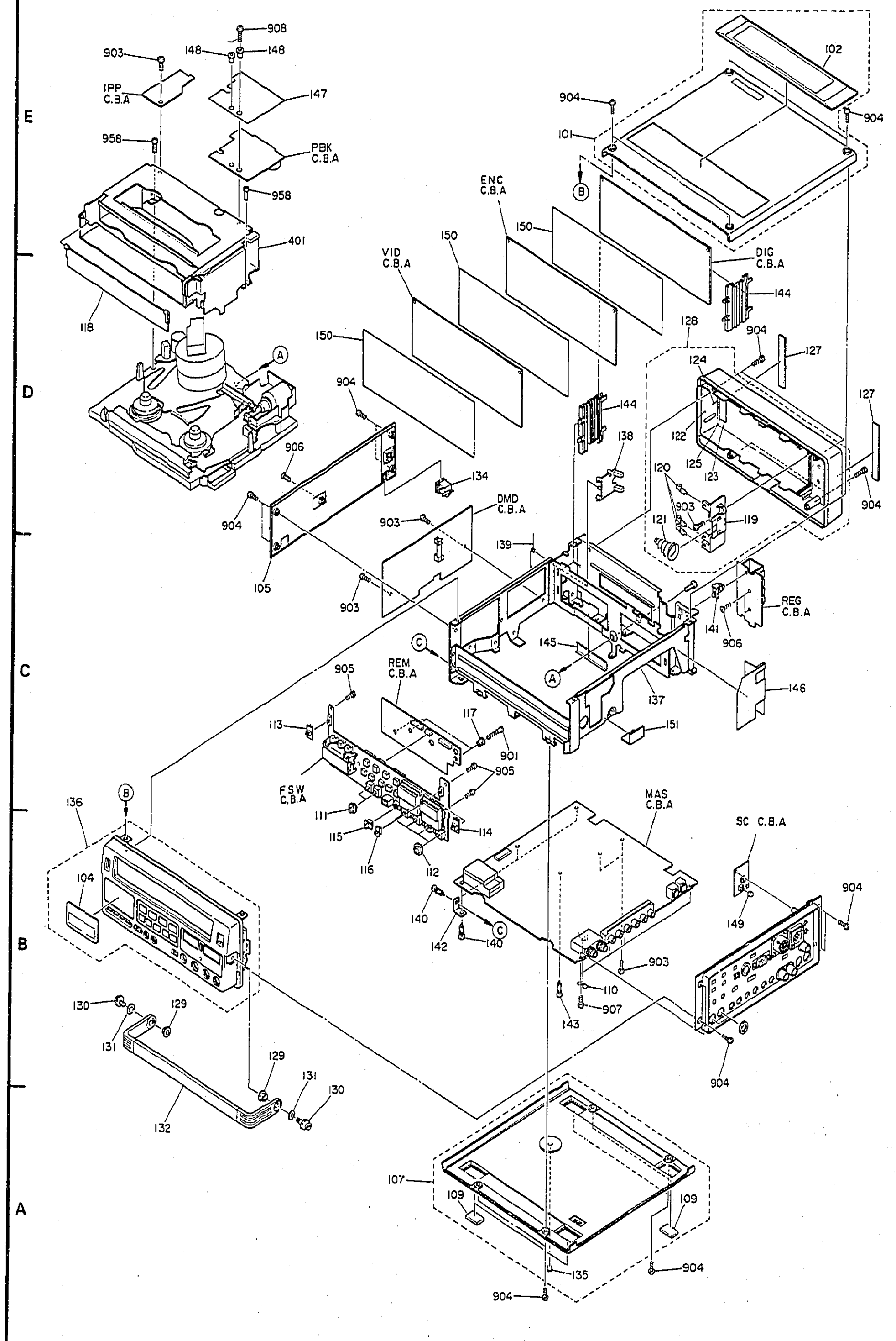
SYMBOL-NO	P-NO	DESCRIPTION
		FOR FINAL ASSEMBLY
101	6008101	CASE,TOP
102	6016312	CLEAR,CASSETTE
104	6469442	CLEAR,FRONT
105	6008071	CASE(L)
107	6008091	CASE,BOTTOM
109	7674962	CUSHION
110	7709032	COVER,SWITCH
111	6072121	KNOB,TRACKING
112	6072131	KNOB,CHANNEL
113	6072641	KNOB,POWER
114	6072151	KNOB,EJECT
115	6072161	KNOB,S-VHS
116	6072171	KNOB,HI-FI
117	6809852	SPACER
118	6483721	DOOR,CASSETTE
119	6809842	HOLDER,TERMINAL
120	6527691	TERMINLA,EARTH
121	6523642	SPRING
122	6641812	DOOR
123	6641821	HOLDER,DOOR
124	6552251	SPRING
125	4520331	SHAFT
127	6596133	CUSHION
128	6008081	CASE,BATTERY
129	6593133	COLLAR,HANDLE
130	4520342	SCREW,HANDLE
131	4523671	SPACER,HANDLE
132	6648131	HANDLE
134	5693551	JACK,DC
135	6596081	CAP,RUBBER
136	6483701	PANEL,FRONT
137	7056541	FRAME
138	6089341	LEVER,BATTERY
139	6552262	SPRING
140	6714215	NYLON RIVET
141	6802801	HOLDER,PWB
142	6861971	HINGE
143	6800971	STUD
144	6809861	GUIDE,CBA
146	7708752	SHEET
147	7708582	SHEET
148	6809852	SPACER
149	6017051	BUTTON,GEN LOCK
150	7707832	SHEET
151	7708671	COVER,CONNECTOR
202	6911101	SCREW
203	7412852	BASE-ACE HEAD
204	5449671	HEAD,AUDIO CONTROL
205	6304906	SPRING
206	6522752	SPRING
207	7785673	NUT
208	6807233	BRAKE ASSY
209	6555842	SPRING
210	6415961	SUPPLY REEL
211	7799093	WASHER
212	6415981	TAKE-UP REEL
213	6821461	BRAKE,SUB
214	6975766	ARM,PRESSER ROLLER
215	6807293	SLIDER BLOCK
216	7412822	PLATE
217	7412816	GEAR,LOADING (L)
218	7412806	GEAR,LOADING (R)
219	6911551	GUIDE ROLLER BASE(IN)
220	6344741	GUIDE ROLLER
221	6911572	GUIDE ROLLER BASE(OUT)
222	6911004	BASE
223	5445851	HEAD FULL ERASE
224	6897475	ARM, IMPEDANCE
225	4508237	GUIDE,TAPE
226	6555431	SPRING
227	6806423	BAND,TENSHION
228	7448992	ARM,TENSHION
229	6555446	SPRING
230	6897264	HOLDER
231	6896751	ARM
232	6555061	SPRING
233	5384851	DEW SENSOR
234	6552482	SPRING
235	7468116	LOADING BLOCK
236	7473141	BRACKET ASSY
237	7412881	ARM
238	6976551	ARM
239	7412893	ARM
240	7428072	ARM,OPERATION
241	6807261	ARM,BRAKE
242	6552473	SPRING
243	6804792	BRAKE
244	6896895	HOLDER,MOTOR
245	6807361	ARM
246	6897251	ARM
247	6555483	SPRING
248	6897271	ARM
249	6440081	GEAR,MODE
250	6434861	WORM WHEEL
251	6555052	SPRING
252	7799012	WASHER
253	6976372	ARM
254	7786623	POLYSLIDER WASHER
255	4508235	GUIDE
256	6806383	SHAFT
257	6807382	ARM
258	6437621	ARM,FR
259	7789303	WASHER
260	7789684	WASHER
261	6437682	GEAR
262	7786626	WASHER
263	6440182	GEAR
264	6440192	GEAR
265	7788347	WASHER
266	7468101	RACK,SPRING
267	6807371	ARM,OPERATION
268	5601551	SWITCH
269	8711104	SCREW 2X4
270	6915958	ARM
271	7787412	WASHER
272	7742371	PAD,BRAKE
273	7743592	PAD,BRAKE
274	7744666	PAD,BRAKE
301	5571721	MOTOR,CAPSTAN
302	6807194	BASE,GEAR
303	5571682	MOTOR,REEL
304	6807442	COVER
305	6434851	RACK
401	7132782	FRONT LOADING MECHA
402	6807452	BRACKET ASSY
403	6896685	BRACKET,SIDE(R)
404	6437712	WORM ASSY

SYMBOL-NO	P-NO	DESCRIPTION
405	6435571	WORM
406	4508221	WORM SHAFT
407	6896623	ARM,DOOR
408	6896632	ARM-SWITCH
409	6302474	SPRING
410	6897041	ARM-SWITCH
411	7442511	BRACKET,GEAR
412	7472082	HOLDER,CASSETTE
413	7449165	BASE,CYLINDER
414	6896664	HOLDER,CASSETTE (R)
415	7428113	HOLDER,STAY
416	6820361	ARM
417	6897001	ARM
418	6556241	SPRING
419	6896673	HOLDER,CASSETTE (L)
420	7412944	ARM
421	6555772	SPRING
422	6528711	SPRING
423	6806521	HOLDER,FRONT
424	7580791	SHAFT ASSY
425	7412551	BRACKET-SIDE (L)
426	7794391	WASHER
427	6324365	SPRING
501	5436321	CYLINDER ASSY (CY-ROC1-F-SA)
901	8691318	SCREW (2.6X18)
903	8691408	SCREW (3X8)
904	8699408	SCREW
905	8691306	BT SCREW 2.6MM
906	8724410	FELT SCREW-3MMDX10MM(BLACK)
907	8691106	SCREW (2X6)
908	8691412	SCREW (3X12)
951	0741312	BIND SCREW 2.6MMDX12MM
952	8671416	SCREW
953	8741405	SCREW - 3MMD X 5MM BIND
954	7781872	SCREW-3MMDX8MM
955	7773086	SCREW
956	8741414	SCREW (3X14)
957	8671412	SCREW
958	8671408	DT BIND SCREW-3MMDX8MM
959	8741405	SCREW - 3MMD X 5MM BIND
960	8671412	SCREW
961	7785941	SCREW
962	8671406	SCREW
963	8691308	BT SCREW-2.6MMDX8MM
964	7775581	SCREW(M3X14)
		FOR ACCESSORIES
801	4634233	OPERATING GUIDE
802	5858511	PLUG,BATTERY
803	7743522	CASE,CARRING
804	7743531	STRAP

SYMBOL-NO	P-NO	DESCRIPTION

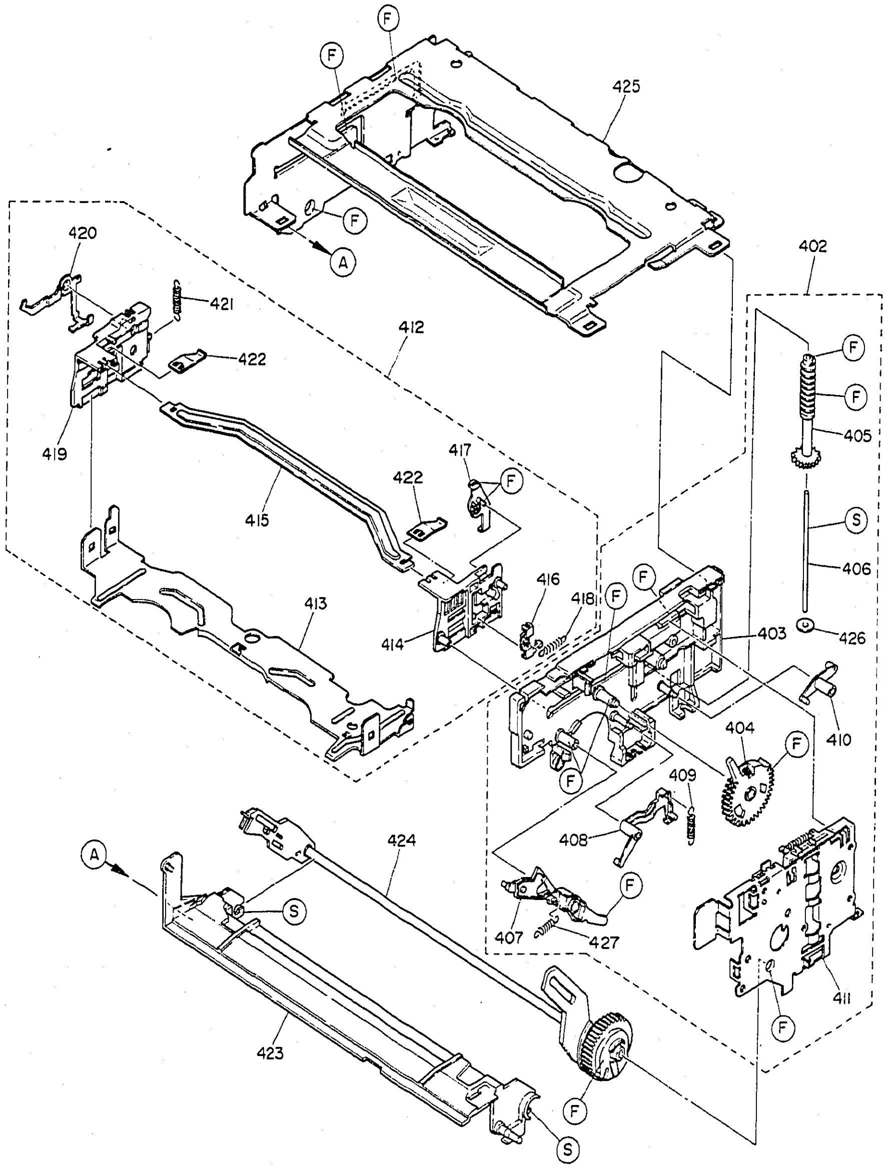
EXPLODED VIEWS (VL-S100)

CABINET SECTION



E
D
C
B
A
1
2
3
4
908
903
148
148
IPP C.B.A
147
958
PBK C.B.A
958
401
118
A
D
904
101
102
904
B
ENC C.B.A
150
150
VID C.B.A
150
DIG C.B.A
144
128
904
127
124
127
144
138
122
125
123
120
903
121
119
904
906
134
904
105
903
DMD C.B.A
903
139
C
145
A
137
141
906
REG C.B.A
146
151
905
REM C.B.A
113
117
901
905
FSW C.B.A
111
115
116
114
112
MAS C.B.A
SC C.B.A
B
136
104
140
142
C
140
149
904
903
110
907
143
130
129
131
129
131
130
132
904
107
109
109
135
904
904

CASSETTE LOADING MECHANISM SECTION

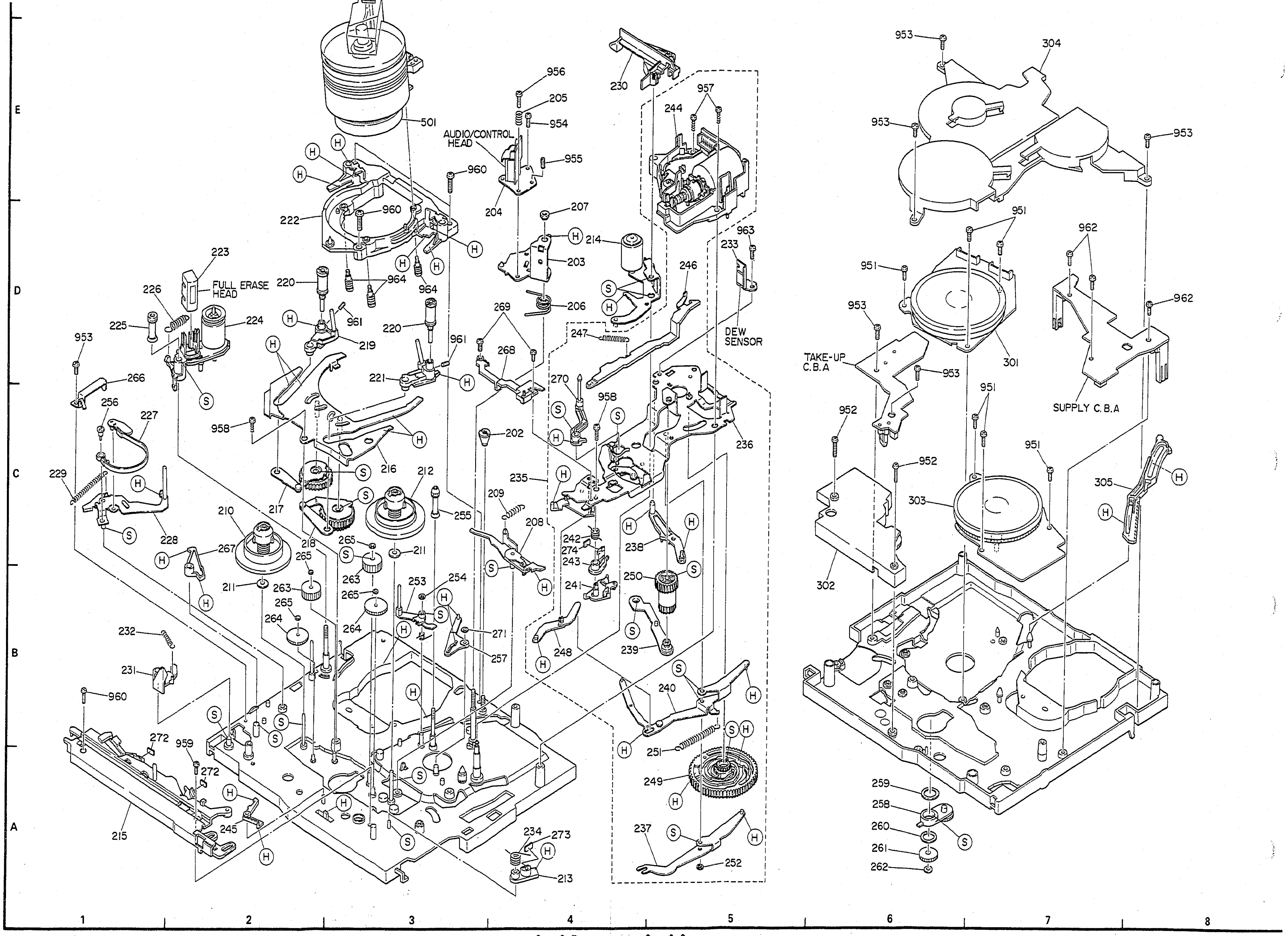


F
F
425
F
A
402
420
421
422
412
F
F
405
419
417
F
422
415
S
406
416
418
F
F
413
414
403
426
410
404
F
F
409
408
424
A
S
F
407
427
411
F
423
F
S
5
6
7
8

Ⓢ = Sonic slider oil (#1600)

Ⓕ = Froil (GB—TS—1)

CHASSIS SECTION


E
D
C
B
A
1
2
3
4
5
6
7
8
501
956
205
954
AUDIO/CONTROL HEAD
955
960
204
207
203
H
214
206
230
957
244
963
233
246
DEW SENSOR
953
304
951
962
TAKE-UP C.B.A
SUPPLY C.B.A
301
952
303
302
305
222
223
FULL ERASE HEAD
226
225
224
220
964
961
219
221
266
256
227
958
216
217
218
S
212
210
229
228
267
211
265
263
264
253
254
255
209
208
202
235
269
268
270
247
236
242
274
243
241
238
250
239
248
240
251
249
237
252
232
231
272
959
215
245
234
273
213
257
271
259
258
260
261
262

VL-AC10

1. DISASSEMBLY

1-1 Top Cover Removal

1) Remove ten (10) screws (4 at the top and 3 on each side) holding the cover.

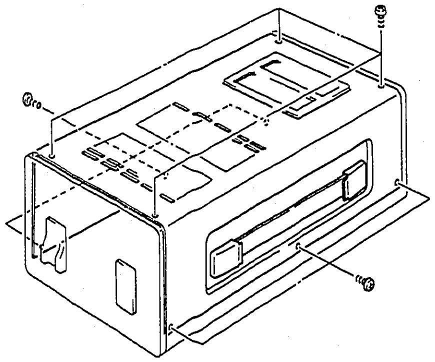


Fig. 1

1-2 Front Panel Removal

1) Remove two (2) screws holding the rear panel.

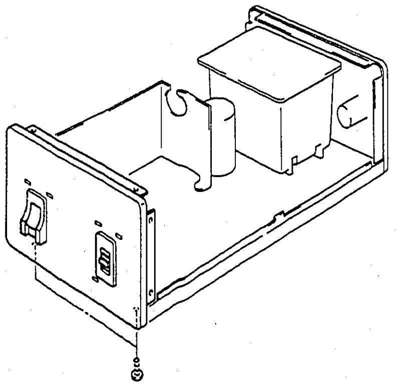


Fig. 2

1-3 Rear Panel Removal

1) Remove two (2) screws holding the rear panel.

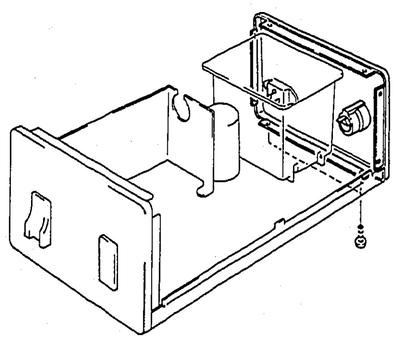


Fig. 3

1-4 Battery Compartment Removal

1) Remove four (4) screws holding the battery compartment.

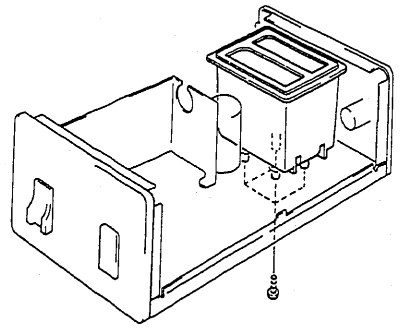


Fig. 4

1-5 Main Circuit Board Removal

1) Remove five (5) screws holding the main circuit board.

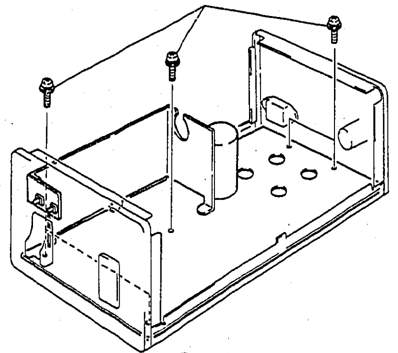


Fig. 5

2. ELECTRICAL ADJUSTMENT

2-1 Preparation for Adjustment

(1) Check that the circuit board is not defective (parts with specified polarity, soldering and wiring of power switch cord and on the LED circuit board).
(2) Set the mode switch to CHG (CHARGHE).
(3) Turn trimmers V1, V2 and V3 fully clockwise.
(4) Connect the power cord to AC 120V and turn the POWER switch on.
(5) Check that the LED1 (for adjustment) on the main circuit board and LED2 (POWER) light.

2-2 Charge Overvoltage Adjustment (Charger Mode)

(1) Set the VL-AC10 to the non-loaded state without attaching a battery. Turn V3 (charge overvoltage adjustment) gradually clockwise and stop where the LED on the main circuit board goes out.
Check that LED2 (POWER) goes out and LED1 (ALARM) flashes.
(2) Set the mode switch to DC OUT. Since the VL-AC10 has been set to the alarm state by the above adjustments, turn the POWER switch off to release ALARM. Turn the POWER switch on again.
(3) Check that the LED on the main circuit board, LED2 (POWER) and LED3 (DC OUT) light.

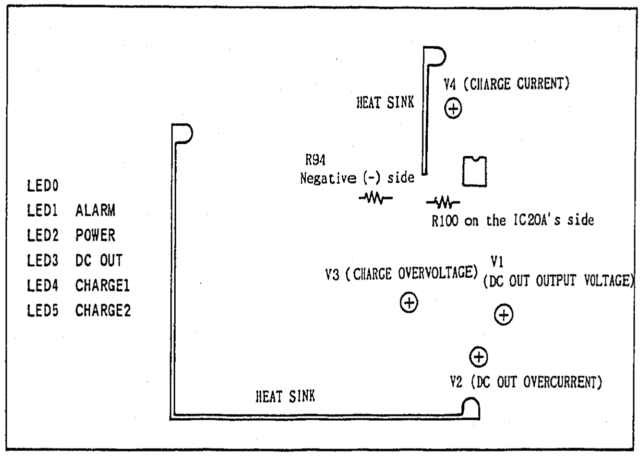
2-3 DC OUT Output Voltage Adjustment (Adapter Mode)

(1) Do not connect any load to DC OUT.
(2) Adjust V1 (DC OUT output voltage adjustment) so the voltage at pin 4 of DC OUT is 13.9±0.1V. Use pin 1 of DC OUT or GND of the wiring on the circuit board as ground.

2-4 Adapter Mode Overcurrent Adjustment

(1) Turn V2 (DC OUT overcurrent adjustment) counterclockwise by 135° (95° and 45°).
(2) Set the mode switch to CHARGE.

MAIN P.C.B



2-5 Charge Constant Current Adjustment

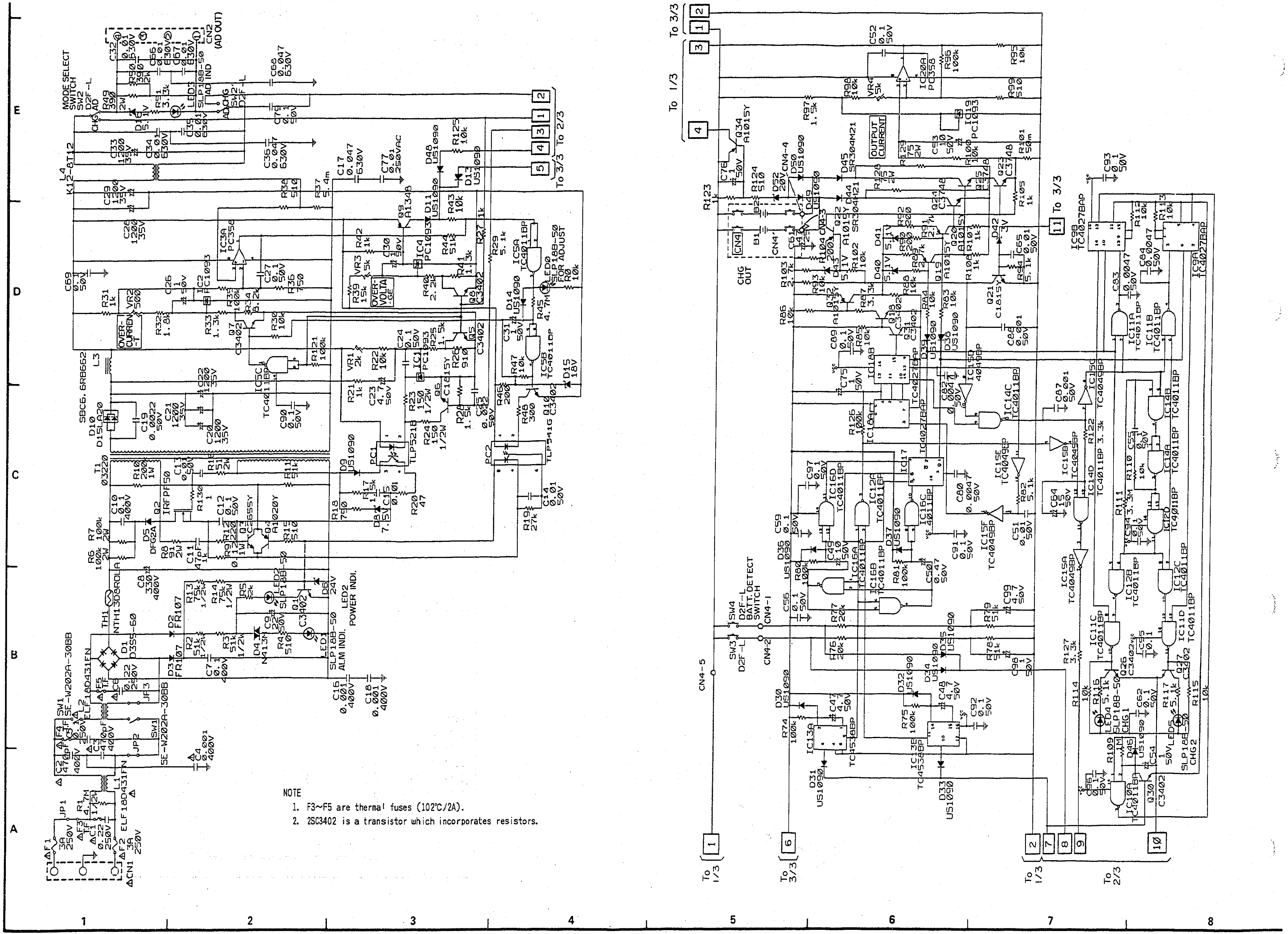
(1) Connect a DC voltmeter or an oscilloscope to R94 and R100 with the GND side of R94 connected to the negative (-) terminal and the side of R100 connected to IC20A connected to the positive (+) terminal.
(2) Insert a battery (VL-BP12) into battery box No. 1 or No. 2 and turn the POWER switch on. (Charger Mode)
(3) Adjust V4 (charge current adjustment) so the average DC voltage at the positive (+) point is 100mV. Check the following after this.

- When a battery (VL-BP12) is inserted into battery box No. 1 or No. 2, charging starts and LED4 (CHARGE 1) or LED5 (CHARGE 2) flashes.
- When two batteries are inserted, the POWER switch is turned off and then on again, charging starts from the battery in battery box No. 1.

Cautions

(1) When the B1 or B2 switch is turned on in the CHARGE mode and output is not loaded, the output interrupted and ALARM is displayed. This is becasue the defective battery contact detector operates. In this case, turn the POWER switch off to release ALARM.
(2) When the output voltage is 18.8V or more during CHARGE constant current adjustment, the output is interrupted and ALARM is displayed. This is the same as in (1).

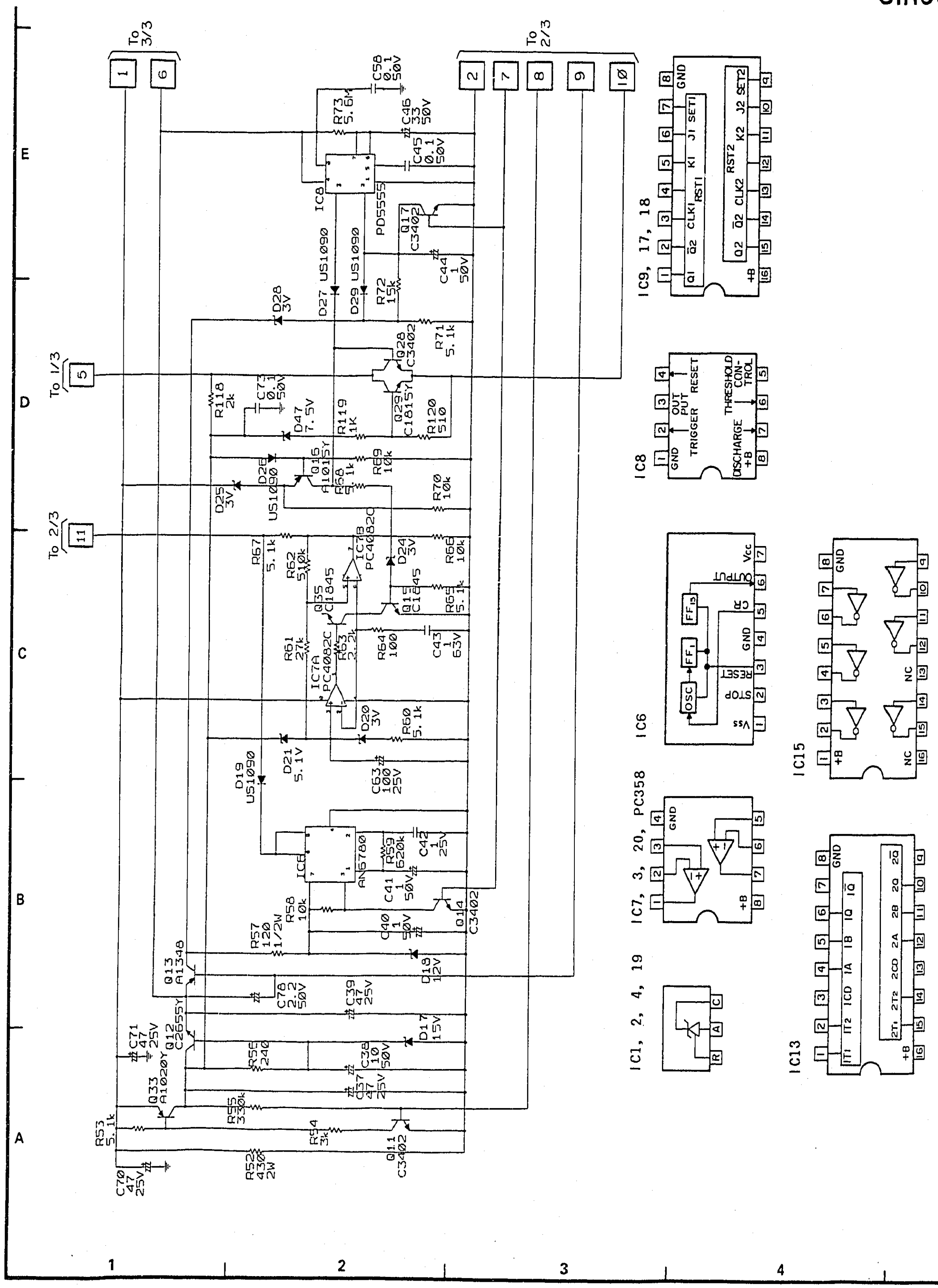
SCHEMATIC DIAGRAM (VL-AC10)


MODE SELECT SWITCH SW2 D2F-L
CN2 (AD OUT)
AD IND
LED3 SLP18B-50
L4 K12-8T12
OVER-CURRENT
OVER-VOLTAGE
SBC6.6R8662
L3
D10 D15LA20
T1 03220
Q2 IRFPF50
SW1 SE-W202A-30BB
TH1 NTH13D080LA
D1 D3SB-60
LED1 SLP18B-50 ALM INDI.
LED2 POWER INDI.
LED0 SLP18B-50 FOR ADJUST
PC1 TLP521B
PC2 TLP541G
ΔF1 3A 250V
ΔF2 ELF18D431FN 3A 250V
ΔCN1
To 1/3
To 2/3
To 3/3
CHG OUT
OUTPUT CURRENT
SW4 D2F-L BATT. DETECT SWITCH
SW3 D2F-L
CN4-1
CN4-2
CN4-3
CN4-4
CN4-5
IC9A TC4027BAP
IC9B TC4027BAP
IC20A PC358
IC19 PC1093
LED4 SLP18B-50 CHG1
LED5 SLP18B-50 CHG2
A
B
C
D
E
1
2
3
4
5
6
7
8

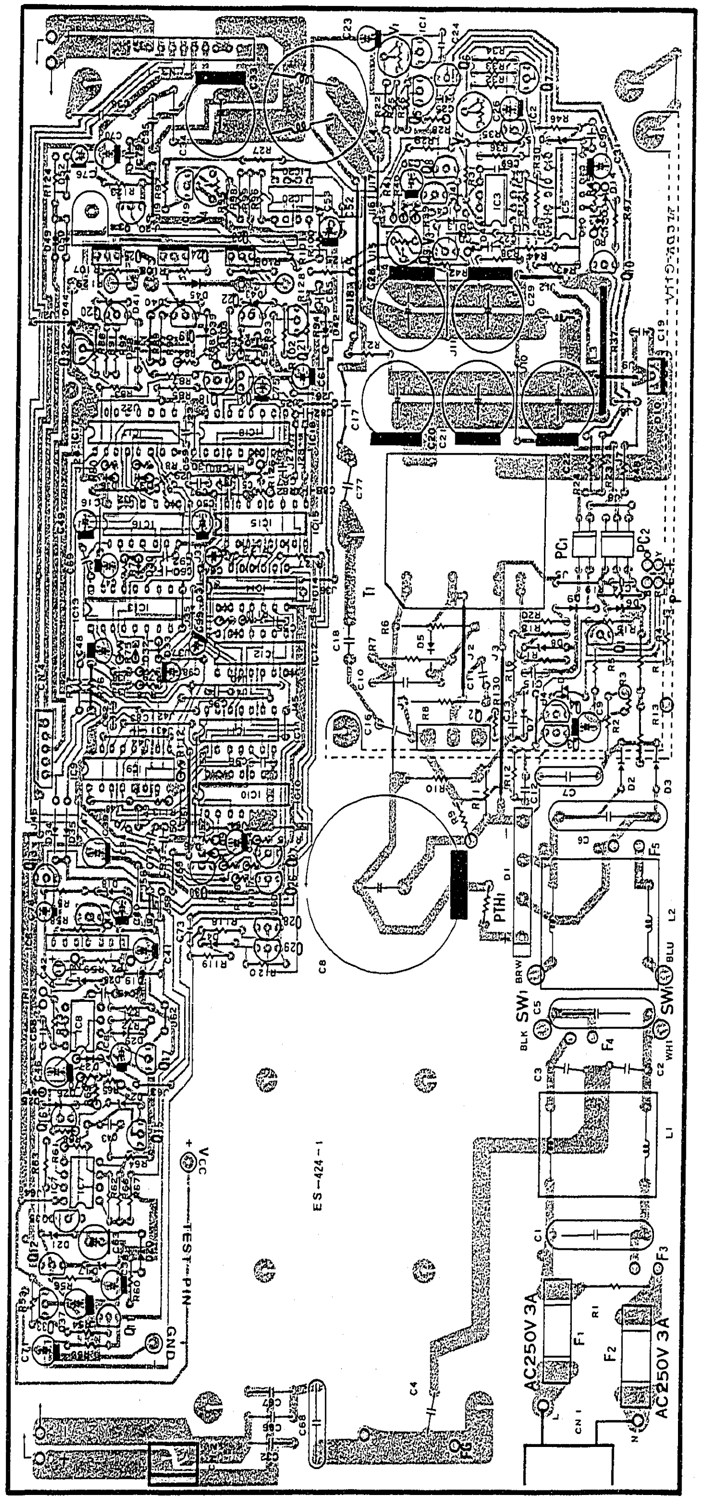
NOTE

1. F3~F5 are thermal fuses (102°C/2A).
2. 2SC3402 is a transistor which incorporates resistors.

CIRCUIT BOARD DIAGRAM (VL-AC10)



To 3/3
To 2/3
To 1/3
To 2/3
IC8 PD5555
Q17 C3402
Q28 C3402
Q29 C1815Y
Q16 A1015Y
IC7B PC4082C
IC7A PC4082C
Q35 C1845
Q15 C1845
IC6 AN6780
Q14 C3402
Q13 A1348
Q12 C2655Y
Q33 A1020Y
Q11 C3402
D27 US1090
D29 US1090
D28 3V
D47 7.5V
D26 US1090
D25 3V
D24 3V
D20 3V
D21 5.1V
D19 US1090
D18 12V
D17 15V
IC9, 17, 18
IC8
IC6
IC7, 3, 20, PC358
IC1, 2, 4, 19
IC15
IC13
1
2
3
4
5
6
7
8
A
B
C
D
E



ES-424-1
TEST-PIN
GND
Vcc
AC250V 3A
AC250V 3A
SW1
SW2
T1
PC1
PC2
PTH1

VL-AC10 ADAPTOR/CHARGER P.C.B
—COMPONENTS SIDE—

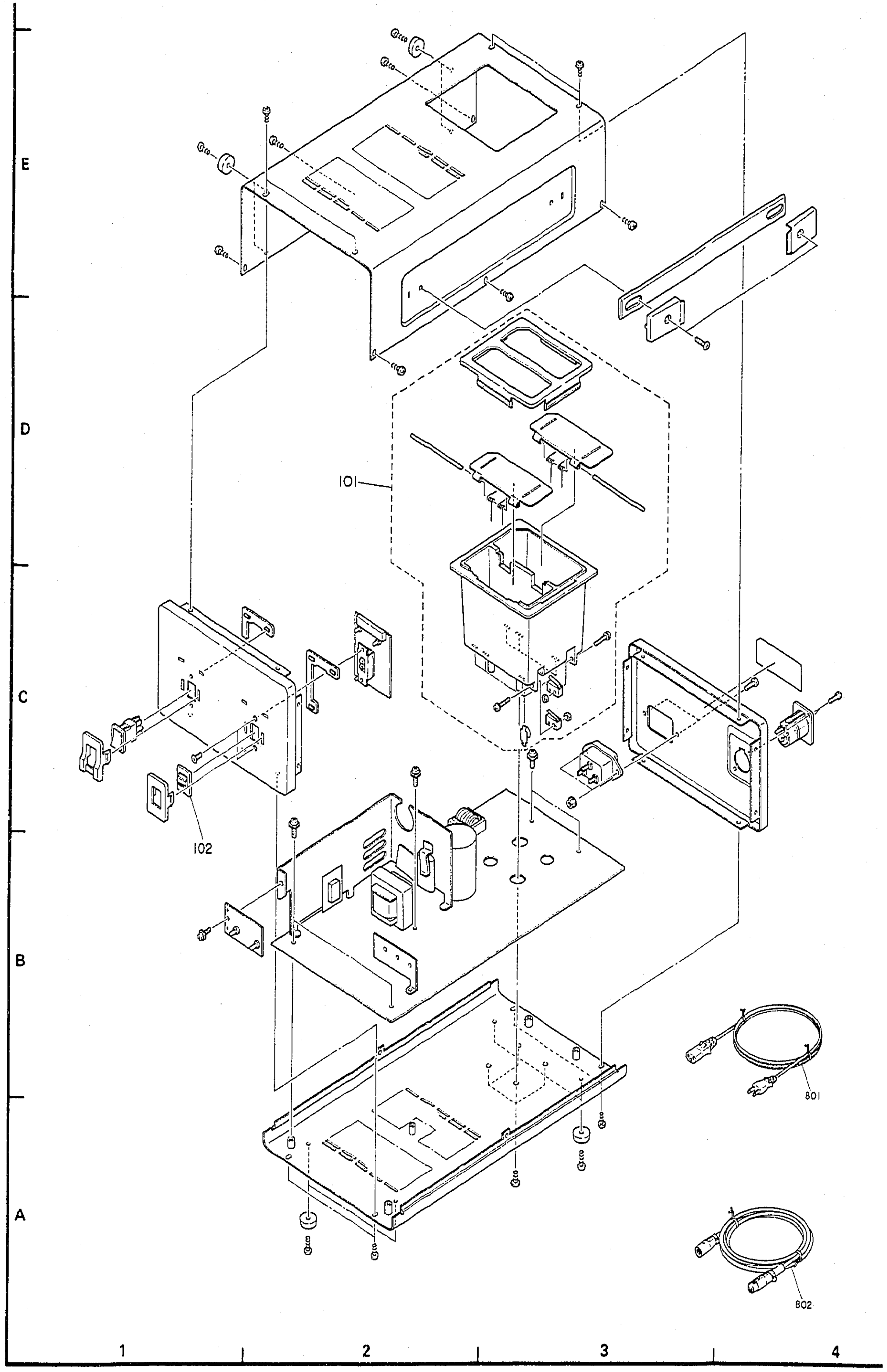
ELECTRICAL PARTS LIST (VL-AC10)

SYMBOL-NO	P-NO	DESCRIPTION
		SEMI-CONDUCTORS
D 1	5382602	DIODE D3SB60
D 2	5382561	DIODE FR107
D 3	5382561	DIODE FR107
D 4	5382583	DIODE N413M
D 5	5382581	DIODE DFG2A
D 6	5382648	DIODE RD24EB2
D 8	5330844	DIODE RD7-5EB SI ZENER
D 9	5382582	DIDOE US1090
D 10	5382601	DIODE D15LCA20
D 11	5382582	DIDOE US1090
D 13	5382582	DIDOE US1090
D 14	5382582	DIDOE US1090
D 15	5382646	DIODE RD18EB3
D 16	5330848	DIODE RD5-1EB2 SI ZENER
D 17	5382645	DIODE RD15EB2
D 18	5382644	DIDOE RD12EB2
D 19	5382582	DIDOE US1090
D 20	5382641	DIODE RD3.0EB2
D 21	5330848	DIODE RD5-1EB2 SI ZENER
D 24	5382641	DIODE RD3.0EB2
D 25	5382641	DIODE RD3.0EB2
D 26	5382582	DIDOE US1090
D 27	5382582	DIDOE US1090
D 28	5382641	DIODE RD3.0EB2
D 29	5382582	DIDOE US1090
D 30	5382582	DIDOE US1090
D 31	5382582	DIDOE US1090
D 32	5382582	DIDOE US1090
D 33	5382582	DIDOE US1090
D 34	5382582	DIDOE US1090
D 35	5382582	DIDOE US1090
D 36	5382582	DIDOE US1090
D 37	5382582	DIDOE US1090
D 38	5382582	DIDOE US1090
D 39	5382582	DIDOE US1090
D 40	5330848	DIODE RD5-1EB2 SI ZENER
D 41	5330848	DIODE RD5-1EB2 SI ZENER
D 42	5382641	DIODE RD3.0EB2
D 43	5330848	DIODE RD5-1EB2 SI ZENER
D 44	5382562	DIODE SR304M21
D 45	5382562	DIODE SR304M21
D 46	5382582	DIDOE US1090
D 47	5330844	DIODE RD7-5EB SI ZENER
D 48	5382582	DIDOE US1090
D 49	5382582	DIDOE US1090
D 50	5382582	DIDOE US1090
D 52	5382647	DIODE RD20EB1
IC 1	1388451	IC UPC1093J
IC 2	1388451	IC UPC1093J
IC 3	5352091	IC UPC358C
IC 4	1388451	IC UPC1093J
IC 5	1361632	IC TC4011BP
IC 6	1343591	IC AN6780
IC 7	1361611	IC UPC4082C
IC 8	1361621	IC UPD5555C
IC 9	1361633	IC TC4027BP
IC 10	1361632	IC TC4011BP
IC 11	1361632	IC TC4011BP
IC 12	1361632	IC TC4011BP
IC 13	1361631	IC TC4538BP
IC 14	1361632	IC TC4011BP
IC 15	5350863	IC TC4049
IC 16	1361632	IC TC4011BP
IC 17	1361633	IC TC4027BP
IC 18	1361633	IC TC4027BP
IC 19	1388451	IC UPC1093J
IC 20	5352091	IC UPC358C
Q 1	1322231	TRANSISTOR 2SC3402
Q 2	1322241	TRANSISTOR IRFPF50
Q 3	5324971	TRANSISTOR 2SC2655
Q 4	5323351	TRANSISTOR 2SA1020Y
Q 5	1322231	TRANSISTOR 2SC3402
Q 6	1322271	TRANSISTOR 2SC1815Y
Q 7	1322231	TRANSISTOR 2SC3402
Q 8	1322231	TRANSISTOR 2SC3402
Q 9	1322272	TRANSISTOR 2SA1348
Q 10	1322231	TRANSISTOR 2SC3402
Q 11	1322231	TRANSISTOR 2SC3402
Q 12	5324971	TRANSISTOR 2SC2655
Q 13	1322272	TRANSISTOR 2SA1348
Q 14	1322231	TRANSISTOR 2SC3402
Q 15	5323031	TRANSISTOR 2SC1845EF
Q 16	5322248	TRANSISTOR 2SA1015Y SILICON 80MHZ 0.4W
Q 17	1322231	TRANSISTOR 2SC3402
Q 18	1322231	TRANSISTOR 2SC3402
Q 19	5322248	TRANSISTOR 2SA1015Y SILICON 80MHZ 0.4W
Q 20	5322248	TRANSISTOR 2SA1015Y SILICON 80MHZ 0.4W
Q 21	1322271	TRANSISTOR 2SC1815Y
Q 22	5322248	TRANSISTOR 2SA1015Y SILICON 80MHZ 0.4W
Q 23	1322232	TRANSISTOR 2SC3748
Q 24	1322232	TRANSISTOR 2SC3748
Q 25	1322232	TRANSISTOR 2SC3748
Q 26	1322231	TRANSISTOR 2SC3402
Q 27	1322231	TRANSISTOR 2SC3402
Q 28	1322231	TRANSISTOR 2SC3402
Q 29	1322271	TRANSISTOR 2SC1815Y
Q 30	1322231	TRANSISTOR 2SC3402
Q 31	1322231	TRANSISTOR 2SC3402
Q 32	5322248	TRANSISTOR 2SA1015Y SILICON 80MHZ 0.4W
Q 33	5323351	TRANSISTOR 2SA1020Y
Q 34	5322248	TRANSISTOR 2SA1015Y SILICON 80MHZ 0.4W
Q 35	5323031	TRANSISTOR 2SC1845EF
		TRANSFORMER
⚠T 1	5216851	TRANSFORMER,POWER
		MISCELLANEOUS
⚠F 1	5723041	FUSE 3A
⚠F 2	5723041	FUSE 3A
⚠F 3	5723042	FUSE 2A
⚠F 4	5723042	FUSE 2A
⚠F 5	5723042	FUSE 2A
LED 0	5382584	DIDOE SLP18B-50
LED 1	5382584	DIDOE SLP18B-50
LED 3	5382584	DIDOE SLP18B-50
LED 4	5382584	DIDOE SLP18B-50
LED 5	5382584	DIDOE SLP18B-50
PC 1	1341732	PHOTO CUPLER TLP521GB
PC 2	5390501	PHOTO THYRISTER TLP541G
SW 1	5621801	SWITCH
SW 2	5621803	SWITCH
SW 3	5621803	SWITCH
SW 4	5621802	SWITCH
TH 1	5340511	THERMISTOR 5D-11

MECHANICAL PARTS LIST (VL-AC10)

SYMBOL-NO	P-NO	DESCRIPTION
		FOR FINAL ASSEMBLY
101	4100431	CASE,BATTERY
102	4100432	LEVER,SWITCH
		FOR ACCESSORIES
⚠801	5852513	CORD,POWER
802	5852511	CORD,DC

EXPLODED VIEW (VL-AC10)


E
D
C
B
A
1
2
3
4
101
102
801
802

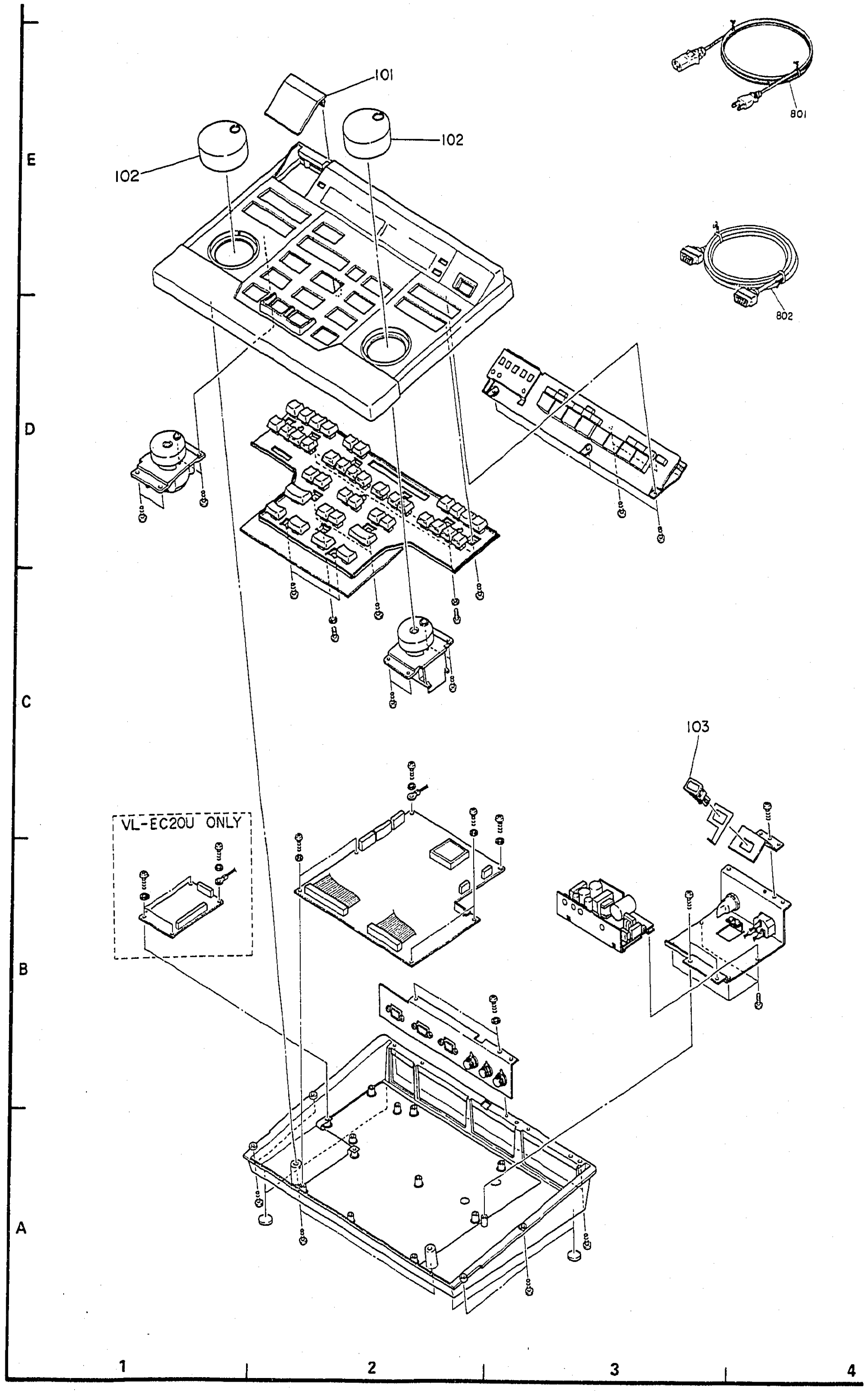
MECHANICAL PARTS LIST (VL-EC10)

SYMBOL-NO	P-NO	DESCRIPTION	SYMBOL-NO	P-NO	DESCRIPTION
		FOR FINAL ASSEMBLY			
101	6488932	DOOR,SWITCH			
102	6598822	KNOB,JOG			
103	5601841	SWITCH			
		FOR ACCESSORIES			
⚠801	5852513	CORD,POWER			
802	5860651	CORD,CONTROLLER			

MECHANICAL PARTS LIST (VL-EC20)

SYMBOL-NO	P-NO	DESCRIPTION	SYMBOL-NO	P-NO	DESCRIPTION
		FOR FINAL ASSEMBLY			
101	6488931	DOOR,SWITCH			
102	6598822	KNOB,JOG			
103	5601841	SWITCH			
		FOR ACCESSORIES			
⚠801	5852513	CORD,POWER			
802	5860651	CORD,CONTROLLER			

EXPLODED VIEW (VL-EC10, VL-EC20)



HITACHI

HITACHI SALES CORPORATION OF AMERICA
Eastern Regional Office
1290 Wall Street West, Lyndhurst, New Jersey 07071, U.S.A.
Tel. 201-935-8980

Mid-Western Regional Office
1400 Morse Ave., Elk Grove Village, Ill. 60007, U.S.A.
Tel. 312-593-1550

Southern Regional Office
510 Plaza Drive, College Park, Georgia 30349, U.S.A.
Tel. 404-763-0360

Western Regional Office
401 West Artesia Boulevard, Compton, California 90220 U.S.A.
Tel. 213-537-8383

HITACHI SALES CORPORATION OF HAWAII. INC.
3219 Koapaka Street. Honolulu, Hawaii 96819, U.S.A.
Tel. 808-836-3621

HITACHI (HSC) CANADA INC.
3300 Trans-Canada Highway, Pointe Claire, Quebec,
H9R 1B1, Canada
Tel. 514-697-9150

Hitachi Sales Centroamericana, S.A.
San Rafael de Escazu, (Apartado 10272), San Jose,
Costa Rica
Tel. 28-20-11, 28-00-37

Hitachi Sales Corporation de Panama, S.A.
Nuevo Reparto El Carmen, Calle Ramon Arias y Calle B
Edificio Brasil 100, (Apartado 7657) Panama 5
Panama City, Rep. of Panama
Tel. 61-6100, 61-4305

Hitachi Sales de Chile Cia., Ltda.
Av. Mexico, 0183, Casilla 9793, Correo Central
Santiago, Chile
Tel. 774165

HITACHI SALES CORPORATION. TOKYO JAPAN
Head Office: THE HITACHI ATAGO BLDG.
No. 15-12, 2-Chome Nishi-Shinbashi
Minato-Ku, Tokyo 105, Japan
Tel. Tokyo (03) 502-2111

VL-S100(U)
VL-AC10(U)
VL-EC10(U)/EC20(U)

TK No.3227E TOKAI

Copyright © Hitachi, Ltd. 1990. All rights reserved.

Printed in Japan (I)

HITACHI

TK

No.3447E

SERVICE MANUAL

VL-S100(U)
VL-AC10(U)
VL-EC10(U)/EC20(U)

SUPPLEMENT *Technical Data*

This manual shows the information on changes to the VL-S100(U) and the schematic and circuit board diagrams and the operation theory of the VL-EC10(U)/20(U) and VL-AC10(U).
Refer to the following manuals issued previously together with this manual.

VHS

This video desk is a S-VHS type video recorder. For proper operation, only the S-VHS type cassette must be used.

MANUALS RELATED TO THE VL-S100(U)/VL-AC10(U)/VL-EC10(U)/EC20(U)

Name of Manual	Language	Manual No.	Chapters included
Technical Data	English	3227E	Chapters 1 - 8
Technical Information	English	3261E	-
Supplement of Technical Information and Technical Data	English	3447E	-

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

S-VHS PROFESSIONAL VCR
AC ADAPTOR/CHARGER
EDITING CONTROL UNIT

July 1991 TOKAI WORKS

CONTENTS

CHAPTER 1
VL-S100 SUPPLYMENT

LIST OF CHANGES TO CIRCUITS AND CIRCUIT BOARDS 1-1
- 1. ADJUSTMENT
  - 1. Servo Circuit Adjustment · · · · · · · · 1-2
  - 2. Video Digital Processing Circuit Adjustment · · · · · · · · · · · · · · · · · · · 1-2
  - 3. Audio Circuit Adjustment · · · · · · · · 1-2
  - 4. Locations of Adjustment Parts · · · · · 1-3
- 2. SCHEMATIC AND CIRCUIT BOARD DIAGRAMS
  - 1. FUNCTION SW Schematic · · · · · · · · · · 1-4
  - 2. PBK Schematic/Circuit Board · · · · · · 1-4
  - 3. DMD Schematic/Circuit Board · · · · · · 1-5
  - 4. REG Schematic/Circuit Board · · · · · · 1-6
  - 5. MAS(WYC) Schematic/Circuit Board · · · · 1-7
  - 6. MAS(SERVO) Schematic/Circuit Board · · · 1-8
  - 7. MAS(JACK) Schematic/Circuit Board · · · 1-12
  - 8. MAS(REG) Schematic/Circuit Board · · · 1-12
  - 9. IPP Shematic · · · · · · · · · · · · · 1-12
  - 10. MAS(AUDIO-Ⅰ) Schematic/Circuit Board · 1-13
  - 11. MSK Schematic/Circuit Board · · · · · · 1-14
  - 12. MAS(AUDIO-Ⅱ) Schematic/Circuit Board · 1-14
  - 13. VID[1/2] Schematic/Circuit Board · · · 1-17
  - 14. VID[2/2] Schematic/Circuit Board · · · 1-19
  - 15. ENC(PB VIDEO PROCESS) Schematic/Circuit Board · · · · · · · · · 1-20
  - 16. ENC(COLOR ENCODER) Schematic/Circuit Board · · · · · · · · · 1-22
  - 17. DIG[1/3] Schematic/Circuit Board · · · 1-25
  - 18. DIG[2/3] Schematic/Circuit Board · · · 1-25
  - 19. DIG[3/3] Schematic/Circuit Board · · · 1-26

SCHEMATIC DIAGRAMS
- SERVO · · · · · · · · · · · · · · · · · · 1-27
- AUDIO-Ⅱ · · · · · · · · · · · · · · · · · 1-30
- VID[1/2] · · · · · · · · · · · · · · · · · 1-33
- VID[2/2] · · · · · · · · · · · · · · · · · 1-36

CIRCUIT BOARD DIAGRAMS
- REG · · · · · · · · · · · · · · · · · · · 1-38
- DIG · · · · · · · · · · · · · · · · · · · 1-39
- MAS · · · · · · · · · · · · · · · · · · · 1-41
- FUNCTION SW · · · · · · · · · · · · · · · 1-45
- PBK · · · · · · · · · · · · · · · · · · · 1-49
- VID · · · · · · · · · · · · · · · · · · · 1-51

CHAPTER 2
VL-EC10/EC20 SCHEMATIC AND CIRCUIT BOARD DIAGRAMS

INTERNAL WIRING DIAGRAM · · · · · · · · · · · 2-1
WIRING CABLE · · · · · · · · · · · · · · · · · 2-3

SCHEMATIC DIAGRAMS
- SBC · · · · · · · · · · · · · · · · · · · 2-4
- PS1 · · · · · · · · · · · · · · · · · · · 2-4
- SCC-1 · · · · · · · · · · · · · · · · · · 2-5
- SCC-2 · · · · · · · · · · · · · · · · · · 2-7
- SCC-3 · · · · · · · · · · · · · · · · · · 2-9
- SCC-4 · · · · · · · · · · · · · · · · · · 2-11
- SCC-5 · · · · · · · · · · · · · · · · · · 2-13
- OPC · · · · · · · · · · · · · · · · · · · 2-15
- DPC-1 · · · · · · · · · · · · · · · · · · 2-17
- DPC-2 · · · · · · · · · · · · · · · · · · 2-19

CIRCUIT BOARD DIAGRAMS
- SCC · · · · · · · · · · · · · · · · · · · 2-21
- SBC · · · · · · · · · · · · · · · · · · · 2-22
- OPC · · · · · · · · · · · · · · · · · · · 2-23
- DPC · · · · · · · · · · · · · · · · · · · 2-23

CHAPTER 3
VL-EC10/20 OPERATION THEORY

- 1. OVERVIEW · · · · · · · · · · · · · · · · · · 3-1
- 2. MAJOR OPERATIONS OF SYSTEM · · · · · · · · 3-1
- 3. SYSTEM OPERATION · · · · · · · · · · · · · 3-1
  - 3-1. System Reset · · · · · · · · · · · · · 3-2
  - 3-2. System Clock (for baud rate) · · · · · 3-2
  - 3-3. System Clock (for whole system) · · · 3-2
- 4. 82C 79P-2 PROGRAMMABLE KEYBOARD/ DISPLAY INTERFACE FUNCTIONS · · · · · · · · · 3-5
  - 4-1. Acceptance of Operation Key Inputs · · 3-5
  - 4-2. 7-Segment Digit Counter Display Drive · · · · · · · · · · · · · · · · · · 3-5
- 5. Z84C90 MULTI-I/O · · · · · · · · · · · · · · 3-6
  - 5-1. Serial Communication Interface · · · · 3-6
  - 5-2. Interrupt Processing Requests · · · · 3-6
  - 5-3. Input/Output Interface · · · · · · · · 3-6
- 6. FUNCTION LED INDICATIONS · · · · · · · · · 3-7
- 7. SYSTEM PRESET INPUT · · · · · · · · · · · · 3-7
- 8. P2 SERIAL COMMUNICATIONS (OPTIONAL FOR THE VL-EC10) · · · · · · · · 3-8
- 9. JOG/SHUTTLE CONTROL · · · · · · · · · · · · 3-9
  - 9-1. Jog/Shuttle Interface · · · · · · · · 3-9
  - 9-2. Interrupts · · · · · · · · · · · · · · 3-9
  - 9-3. Dial Pulse Generator · · · · · · · · · 3-9
  - 9-4. Jog Mode Control · · · · · · · · · · 3-10
  - 9-5. Shuttle Mode Control · · · · · · · · 3-10
- 10. MEMORY/I/O MAP · · · · · · · · · · · · · · 3-11

CHAPTER 4
VL-AC10 OPERATION THEORY

- 1. FUNCTIONS OF VL-AC10 · · · · · · · · · · · 4-1
- 2. VL-AC10 FUNCTION BLOCK DIAGRAM · · · · · · 4-1
- 3. CONSTANT VOLTAGE CONTROL OPERATION · · · · 4-1
- 4. CONSTANT CURRENT CHARGE OPERATION · · · · · 4-2
- 5. ALARM DISPLAY · · · · · · · · · · · · · · · 4-2
  - 5-1. Causes of Alarm Displays · · · · · · · 4-2
  - 5-2. Circuit Operation · · · · · · · · · · 4-2
    - 5-2-1. Overall Operation · · · · · · · · 4-2
    - 5-2-2. Overvoltage Detection · · · · · · 4-2
    - 5-2-3. Overcurrent Detection · · · · · · 4-3
    - 5-2-4. Open Load Detection · · · · · · · 4-3
    - 5-2-5. Exhausted Battery Low-voltage Detection · · · · · · · · · · · 4-3
- 6. -△V CHARGING · · · · · · · · · · · · · · · · 4-4
  - 6-1. Detection Operation · · · · · · · · · 4-4
  - 6-2. Protection Functions · · · · · · · · · 4-4
    - 6-2-1. Protection Timer · · · · · · · · 4-4
    - 6-2-2. Initial Timer · · · · · · · · · · 4-4
  - 6-3. Charging · · · · · · · · · · · · · · · 4-4
    - 6-3-1. When Charging One Battery · · · · 4-4
    - 6-3-2. When Charging Two Battery · · · · 4-5
- 7. INDICATORS · · · · · · · · · · · · · · · · 4-5
  - 7-1. Flashing During Charging · · · · · · · 4-5
  - 7-2. Initial Reset Circuit · · · · · · · · 4-6
  - 7-3. LED Lighting Control · · · · · · · · · 4-6
- 8. TIMER OPERATION · · · · · · · · · · · · · · 4-6
- 9. TIMING CHART · · · · · · · · · · · · · · · 4-8
- 10. WAVEFORMS ON CIRCUITS · · · · · · · · · · 4-9
- 11. SCHEMATIC CIRCUIT DIAGRAM · · · · · · · · 4-13

CHAPTER 5

VL-S100 REPLACEMENT PARTS LIST · · · · · · · · 5-1

LIST OF CHANGES TO CIRCUITS AND CIRCUIT BOARDS

Serial No. of Object Unit / Name of Board / Name of Ciruit	PAGE	TYPE A	TYPE B	TYPE C	TYPE D
		After ×××00051	After ×××00155	After ×××01555	After ×××02291
DIG P.C.B DIG-1/3 DIG-2/3 DIG-3/3	5-76 5-52 5-55 5-58	A 5563241	▨ B 5563242	▨ B	▨ B 5563242
DMD P.C.B DMD	5-62 5-18	A 1540041	B 1540042	B	B 1540042
ENC P.C.B PB VIDEO PROCESS COLOR ENCODER	5-74 5-46 5-49	A 5563231	B 5563232	B	B 5563232
FUNCTION SW P.C.B FUNCTION SW	5-64 5- 9	▨ A 5563282	▨ A	▨ B 5563283 (×××02051-)	▨ B 5563283
IPP P.C.B IPP	5-71 5-32	A 1540711	A	A	A 1540711
MAS P.C.B SYSTEM CONTROL-Ⅰ SYSTEM CONTROL-Ⅱ SERVO JACK REG AUDIO-Ⅰ AUDIO-Ⅱ	5-68 5-21 5-24 5-27 5-30 5-31 5-33 5-36	A 1540701	▨ B 1540702	C 1540703 (Since the information on boards (C) and (D) is the same as that on Part No.2(B), individual diagrams of boards (C) and (D) are not shown in this manual.)	D 1540704
PBK P.C.B PBK	5-64 2-12	▨ A 1540361	▨ B 1540362 (×××00251-)	▨ B	▨ B 1540362
REG P.C.B REG	5-66 5-20	▨ A 1540251	▨ B 1540252 (×××00251-)	▨ B	▨ B 1540252
SPF P.C.B SPF	5-66 5-15	A 1541012	B 1541013	B	B 1541013
VID P.C.B VID-1/2 VID-2/2	5-72 5-39 5-42	A 5563221	▨ B 5563222	▨ B	▨ B 5563222
VRT P.C.B SERVO	– –		▨ A 1503611 (×××00251-)	▨	▨ A 1503611
MSK P.C.B MSK	– –		▨ A 1541641 (×××00551-)	▨	▨ A 1541641
EFL P.C.B VID-1/2	– –			▨ A 1542472 (×××01851-)	▨ A 1542472
VRC P.C.B VID-1/2	– –				▨

How to read the table
The VL-S100's circuits have been changed four times (TYPE A - TYPE D).
Read the information in each column as follows.

Serial No. Object Unit / Name of Board / Name of Circuit	PAGE	TYPE A	B ~ C	TYPE D
		After ×××00051	–	After ×××02291~
DIG P.C.B DIG-1/3	5-76 5-52	A 5563241	–	C 5563243

↑ ↑
Upper row: Name of board |
Lower row: Name of circuit |
Shows the pages in Service Manual No.3227E.

TYPE A~D : Shows the pages in Service Manual No.3227E.
TYPE A shows the product's initial status that is as in the information provided in the manual issued previously.
TYPE B and C show the changes executed after TYPE A. TYPE D shows the last
TYPE D shows the last changed status.
Serial numbers in these columns show that changes have been made from the serial numbers.

xxx00051~ : Shows the serial number of the product from which changes were made.
Therefore, TYPE A changes were applied to products with serial numbers xxx00051~xxx00154.

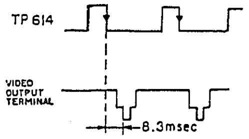
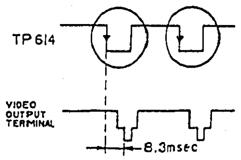
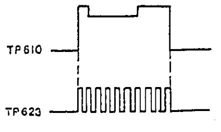
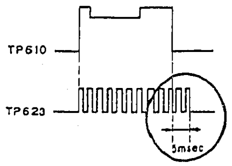
A 5563241 : The letter shows the number of changes. "A" shows the product's initial status. The blank column shows that the board is not used. Therefore, if if "A" first appears in the TYPE B column and later, it indicates that the board was added to the products with the above later. The 7-digit number is a part number printed on the board. Usually, the higher the number of the last digit, the more the changes.

▨ : Circuit board diagrams shown in this manual.

1. ADJUSTMENT

1. Servo Circuit Adjustment

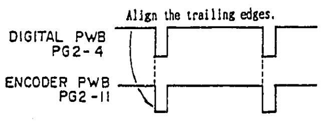
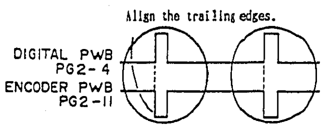
(Corrected section)

Page/Line (Adjustment/Check Column)	Correct	Incorrect
3-2 / 4th Adjustment name Adjustment Procedure	4. RT609(MAS) Playback Pretracking  TP 614 VIDEO OUTPUT TERMINAL 8.3msec	4. RT607(MAS) Playback Pretracking  TP 614 VIDEO OUTPUT TERMINAL 8.3msec
3-3 / 7th Adjustment Procedure	4. Set the SLOW TRACKING control (on the front) to the center.  TP610 TP623	 TP610 TP623 5msec

(Additional adjustment)

	Adjustment	Purpose	Test point	Procedure
9	RT611(MAS) X2 PRETRACKING	To set the tracking so that no switching point appears in the playback picture in the double speed (X2) play mode.	Video output jack (VIDEO OUT)	1. Connect to a monitor TV. 2. Using a blank tape, perform recording for several minutes and then play it back. 3. Adjust so that to switching point appears on the TV screen in the X2 play mode (use an editing controller to set the VTR to the X2 play mode).

2. Video Digital Processing Circuit Adjustment

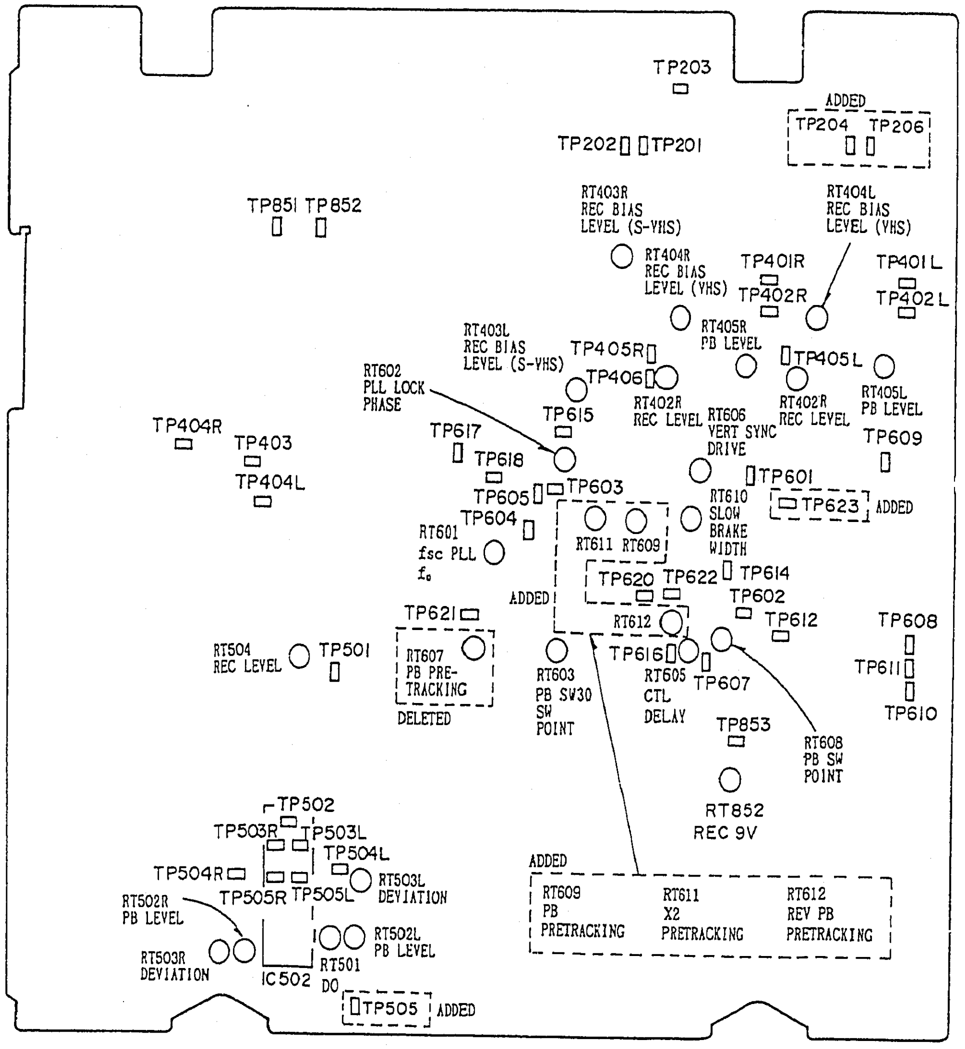
Page/Line (Adjustment/Check Column)	Correct	Incorrect
3-2 / 5th Adjustment Procedure	Align the trailing edges.  Align the trailing edges. DIGITAL PWB PG2-4 ENCODER PWB PG2-11	 Align the trailing edges. DIGITAL PWB PG2-4 ENCODER PWB PG2-11

3. Audio Circuit Adjustment

Page/Line (Adjustment/Check Column)	Correct	Incorrect
3-10 / 6th Adjustment Procedure	2. Connect a DC voltmeter to IC502 pin 18 (TP505).	2. Connect a DC voltmeter to IC502 pin 18.

4. Locations of Adjustment Parts

(RT607 is removed and RT609, RT611, RT612, TP204, TP206, TP505 and TP623 are added in the diagram showing the locations of adjustment parts on the MAS boaed, page 3-12.)

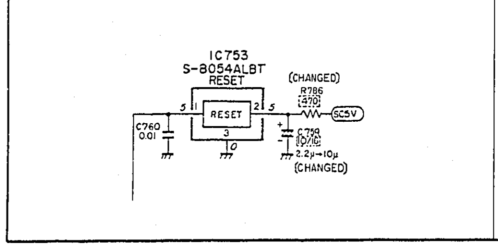
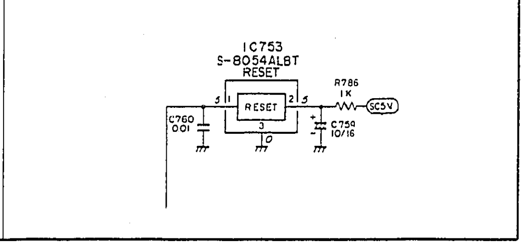

TP203
ADDED
TP204 TP206
TP202 TP201
TP851 TP852
RT403R REC BIAS LEVEL (S-VHS)
RT404L REC BIAS LEVEL (VHS)
RT404R REC BIAS LEVEL (VHS)
TP401R
TP401L
TP402R
TP402L
RT405R PB LEVEL
RT403L REC BIAS LEVEL (S-VHS)
TP405R
TP405L
RT602 PLL LOCK PHASE
TP406
RT402R REC LEVEL
RT402R REC LEVEL
RT405L PB LEVEL
RT606 VERT SYNC DRIVE
TP615
TP609
TP404R
TP403
TP617
TP618
TP601
TP404L
TP605
TP603
RT610 SLOW BRAKE WIDTH
TP623
ADDED
TP604
RT601 fsc PLL f₀
RT611 RT609
TP620 TP622
TP614
TP602
ADDED
TP621
RT612
TP612
TP608
RT504 REC LEVEL
TP501
RT607 PB PRE-TRACKING
DELETED
RT603 PB SW30 SW POINT
TP616
RT605 CTL DELAY
TP607
TP611
TP610
TP853
RT608 PB SW POINT
RT852 REC 9V
TP502
TP503R
TP503L
TP504L
TP504R
RT503L DEVIATION
RT502R PB LEVEL
TP505R
TP505L
ADDED
RT609 PB PRETRACKING
RT611 X2 PRETRACKING
RT612 REV PB PRETRACKING
RT503R DEVIATION
RT502L PB LEVEL
RT501 DO
IC502
TP505
ADDED

MAS PCB

2. SCHEMATIC AND CIRCUIT BOARD DIAGRAMS

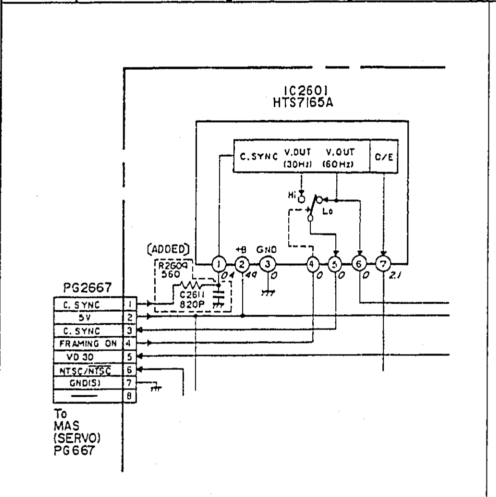
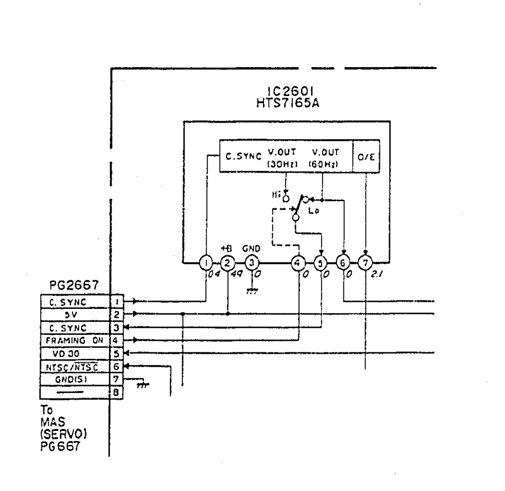
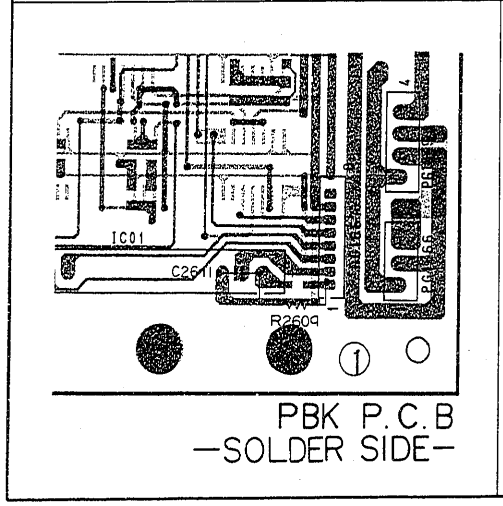
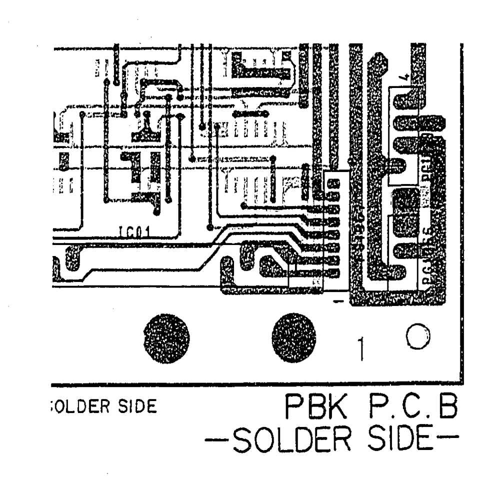
1. FUNCTION SW Schematic (schematic on pages 5-9~5-11 and circuit board on pages 5-64~5-67 in Service Manual No. 3227E.)

(Only the changed sections are shown in the FUNCTION SW schematic.)

<table>
<tr><th>After Change</th><th>Before Change</th></tr>
<tr><td colspan="2">Units with Serial No. (XXX00451 and later) already changed.
page 5-10 (D-7,8)
1. To prevent unstable resetting at low temperatures.</td></tr>
<tr><td>

IC753
S-8054ALBT
RESET
(CHANGED)
R786
(470)
5C5V
C760
0.01
C759
10/16
2.2μ→10μ
(CHANGED)
</td><td>

IC753
S-8054ALBT
RESET
R786
1K
5C5V
C760
0.01
C759
10/16
</td></tr>
</table>

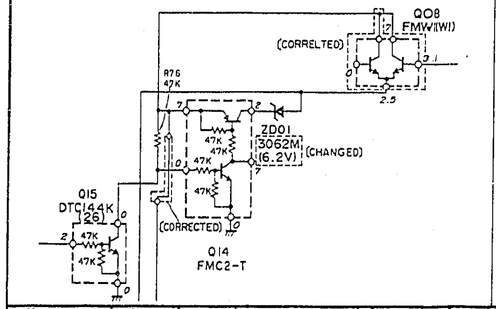
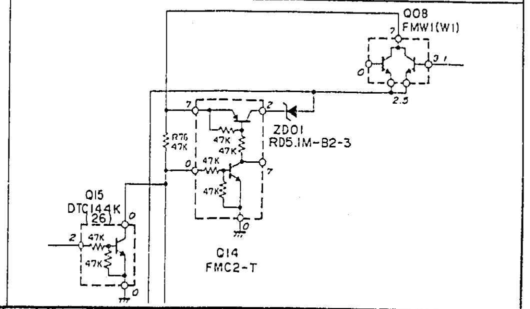
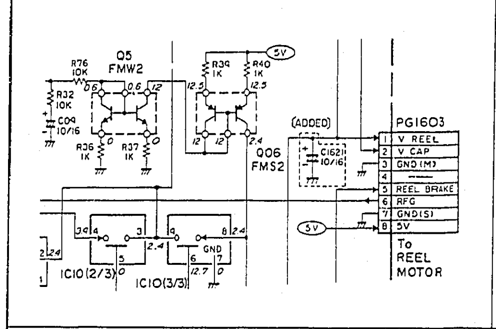
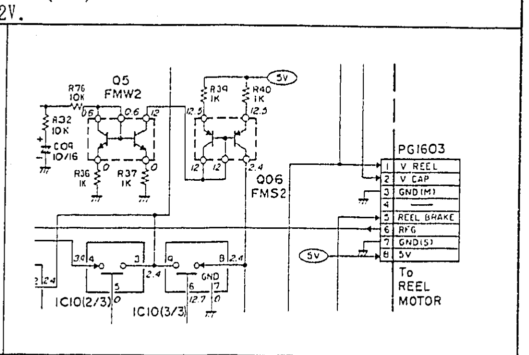
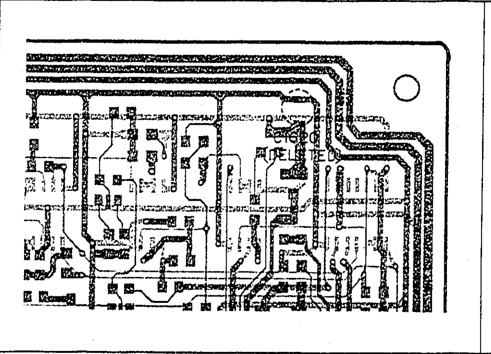
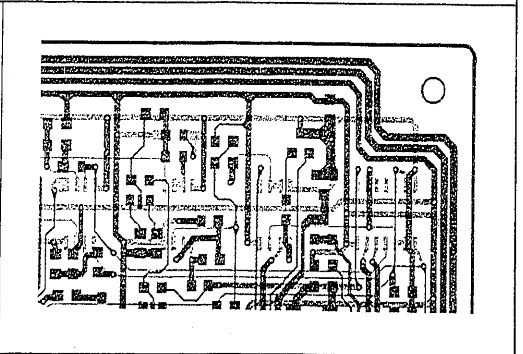
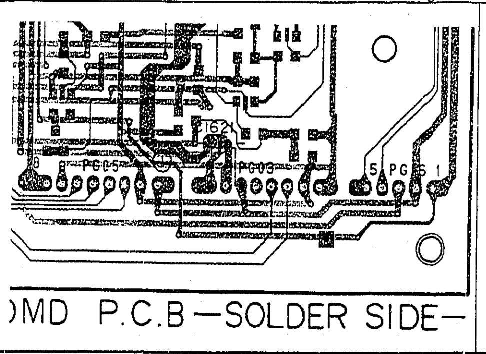
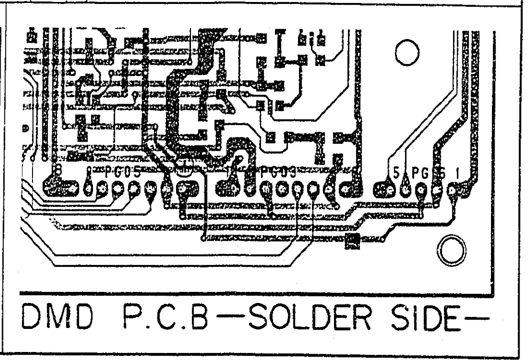
2. PBK Schematic/Circuit Board (schematic on pages 5-12~5-13 and circuit board on pages 5-64~5-67 in Service Manual No. 3227E.)

(Only the changed sections are shown in the PBK schematic and circuit board diagram.)

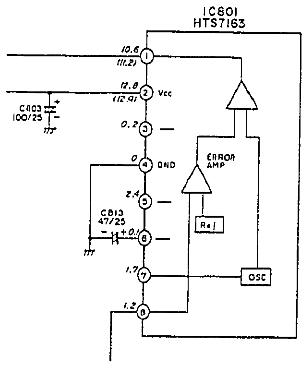
<table>
<tr><th>After Change</th><th>Before Change</th></tr>
<tr><td colspan="2">Units with Serial No. (XXX02251 and later) already changed.
Page 5-12 (E-1)
1. To prevent unlocking of recording servo with framing on (changed simultaneously with item 13.6).</td></tr>
<tr><td>

IC2601
HTS7165A
C.SYNC
V.OUT (30Hz)
V.OUT (60Hz)
O/E
Hi
Lo
(ADDED)
R2609
560
C2611
820P
+B
GND
PG2667
C.SYNC
5V
C.SYNC
FRAMING ON
VD 30
NTSC/NTSC
GND(S)
To MAS (SERVO) PG667
</td><td>

IC2601
HTS7165A
C.SYNC
V.OUT (30Hz)
V.OUT (60Hz)
O/E
Hi
Lo
+B
GND
PG2667
C.SYNC
5V
C.SYNC
FRAMING ON
VD 30
NTSC/NTSC
GND(S)
To MAS (SERVO) PG667
</td></tr>
<tr><td colspan="2">Page 5-65 (D-6)</td></tr>
<tr><td>

IC01
C2611
R2609
①
PBK P.C.B
—SOLDER SIDE—
</td><td>

IC01
1
:OLDER SIDE
PBK P.C.B
—SOLDER SIDE—
</td></tr>
</table>

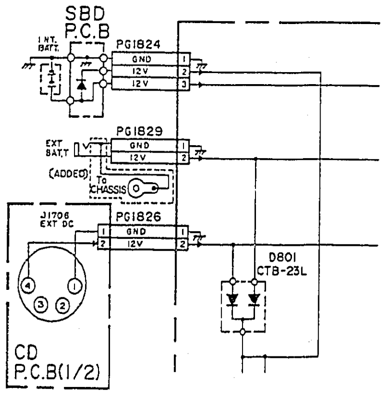
3. DMD Schematic/Circuit Board (schematic on pages 5-18~5-19 and circuit board on pages 5-62~5-63 in Service Manual No. 3227E.)

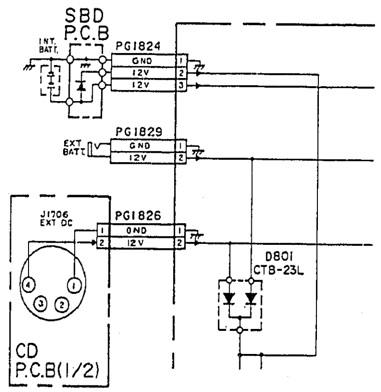
(Only the changed sections are shown in the DMD schematic and circuit board diagram.)

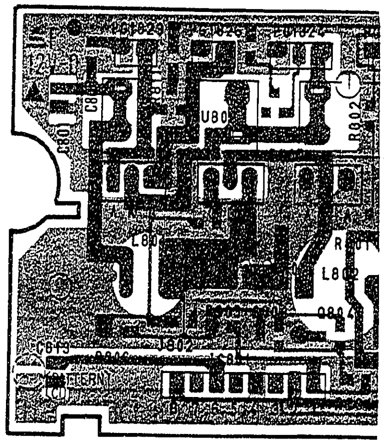
<table>
<tr><th>After Change</th><th>Before Change</th></tr>
<tr><td colspan="2">Units with Serial No. (XXX00151 and later) already changed.
Page 5-18 (D,E-3)
1. To correct the service manual and to prevent the search noise bar flowing at low temperatures.</td></tr>
<tr><td>

Q08
FMW1(W1)
(CORRELTED)
R76
47K
ZD01
3062M
(6.2V)
(CHANGED)
Q15
DTC144K
26
47K
47K
(CORRECTED)
Q14
FMC2-T
</td><td>

Q08
FMW1(W1)
R76
47K
ZD01
RD5.1M-B2-3
Q15
DTC144K
26
47K
47K
Q14
FMC2-T
</td></tr>
<tr><td colspan="2">Units with Serial No. (XXXX02251 and later) already changed.
Page 5-19 (C-7)
2. To prevent recording monitor shutoff with DC 12V.</td></tr>
<tr><td>

Q5
FMW2
R76
10K
R32
10K
C09
10/16
R36
1K
R37
1K
R39
1K
R40
1K
5V
(ADDED)
C1621
10/16
Q06
FMS2
PG1603
V REEL
V CAP
GND(M)
REEL BRAKE
RFG
GND(S)
5V
IC10(2/3)
IC10(3/3)
GND
To REEL MOTOR
</td><td>

Q5
FMW2
R76
10K
R32
10K
C09
10/16
R36
1K
R37
1K
R39
1K
R40
1K
5V
Q06
FMS2
PG1603
V REEL
V CAP
GND(M)
REEL BRAKE
RFG
GND(S)
5V
IC10(2/3)
IC10(3/3)
GND
To REEL MOTOR
</td></tr>
<tr><td colspan="2">Page 5-63 (C-7)</td></tr>
<tr><td>

</td><td>

</td></tr>
<tr><td colspan="2">Page 5-63 (A-6,7)</td></tr>
<tr><td>

PG05
PG03
PG
)MD P.C.B—SOLDER SIDE—
</td><td>

PG05
PG03
PG
DMD P.C.B—SOLDER SIDE—
</td></tr>
</table>

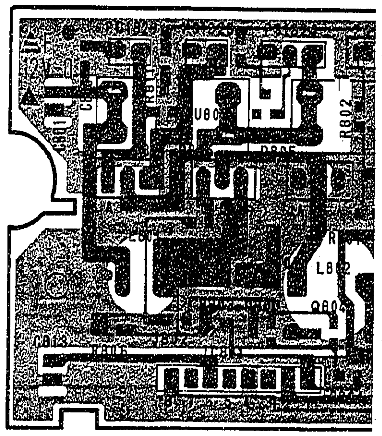
4. REG Schematic/Circuit Board (schematic on pages 5-20 and circuit board on pages 5-66 in Service Manual No. 3227E.)
(Only the changed sections are shown in the REG schematic and circuit board diagram.)

<table>
<tr><th>After Change</th><th>Before Change</th></tr>
<tr><td colspan="2">Units with Serial No. (XXX00151 and later) already changed.
Page 5-20 (C-10,11)
1. To prevent oscillations (horizontal-stripe beats) occurring when a voltage higher than DC 14V is input.</td></tr>
<tr><td></td><td>
IC801
HTS7163
C803 100/25
Vcc
GND
ERROR AMP
C813 47/25
Ref
OSC

</td></tr>
<tr><td colspan="2">Units with Serial No. (XXX00251 and later) already changed.
Page 5-20 (E-9)
2. To prevent static electricity from affecting EXT BATT.</td></tr>
<tr><td>
SBD P.C.B
INT. BATT.
PG1824
GND
12V
PG1829
EXT BATT
(ADDED)
To CHASSIS
J1706 EXT DC
PG1826
D801 CTB-23L
CD P.C.B(1/2)

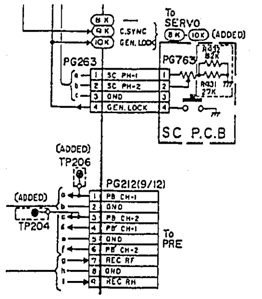
</td><td>
SBD P.C.B
INT. BATT.
PG1824
GND
12V
PG1829
EXT BATT
J1706 EXT DC
PG1826
D801 CTB-23L
CD P.C.B(1/2)

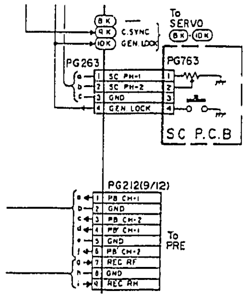
</td></tr>
<tr><td colspan="2">Page 5-66 (C,D-2,3)</td></tr>
<tr><td>
U801
R802
L801
L802
Q804
C813

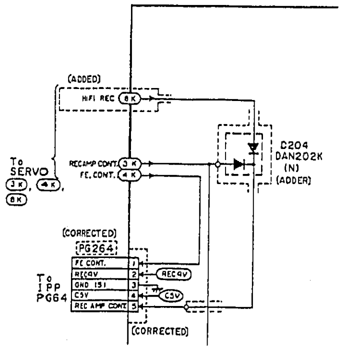
</td><td>
U801
R802
L801
L802
Q804
C813

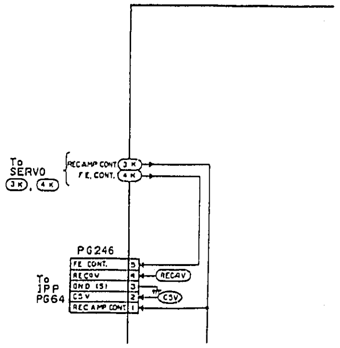
</td></tr>
</table>

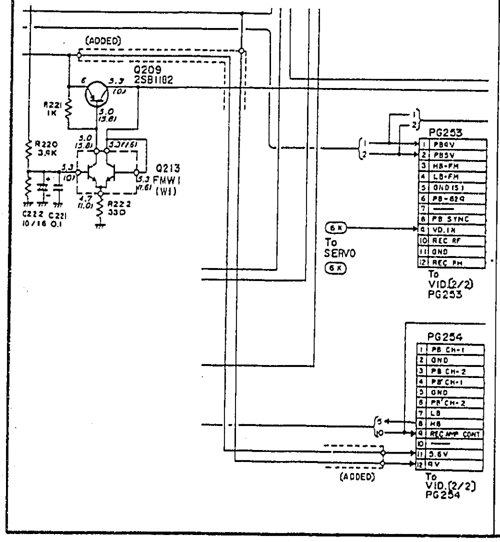
5. MAS(WYC) Schematic/Circuit Board (schematic on pages 5-25~5-26 and circuit board on pages 5-68~5-71 in Service Manual No. 3227E.)
(Only the changed sections are shown in the WYC schematic. Refer to pages 1-41~1-44 for the entire MAS circuit board.)

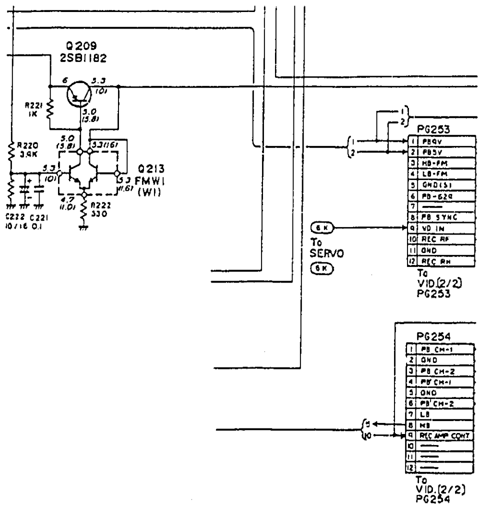
<table>
<tr><th>After Change</th><th>Before Change</th></tr>
<tr><td colspan="2">Units with Serial No. (XXX00151 and later) already changed.
Page 5-26 (C-11)
1. To improve the thermal characteristics of the subcarrier phase (changed simultaneously with item 6.7).</td></tr>
<tr><td>
C.SYNC
GEN. LOCK
To SERVO
(ADDED)
PG263
PG763
R431 27K
SC P.C.B
(ADDED) TP206
(ADDED) TP204
PG212(9/12)
To PRE

</td><td>
C.SYNC
GEN. LOCK
To SERVO
PG263
PG763
SC P.C.B
PG212(9/12)
To PRE

</td></tr>
<tr><td colspan="2">Units with Serial No. (XXX01351 and later) already changed.
Page 5-25 (E-5)
2. To prevent interraption of Hi-Fi sound (changed simultaneously with item 6.7).</td></tr>
<tr><td>
(ADDED)
HiFi REC
To SERVO
RECAMP CONT
FE. CONT.
C204 DAN202K (N) (ADDED)
(CORRECTED)
PG264
To IPP PG64
(CORRECTED)

</td><td>
To SERVO
RECAMP CONT
FE. CONT.
PG246
To IPP PG64

</td></tr>
<tr><td colspan="2">Units with Serial No. (XXX02251 and later) already changed.
Page 5-26 (C,D-9,10)
3. To stabilize the power supply, preventing drift in chroma phase across the top of the screen (changed simultaneously with item 14.4).</td></tr>
<tr><td>
(ADDED)
Q209 2SB1182
R221 1K
R220 3.9K
Q213 FMW1 (W1)
R222 330
C222 C221
PG253
To SERVO
To VID(2/2) PG253
PG254
(ADDED)
To VID(2/2) PG254

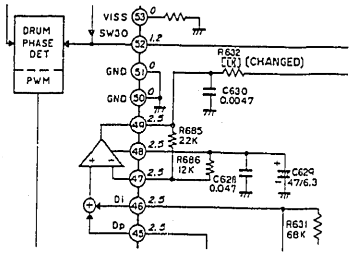
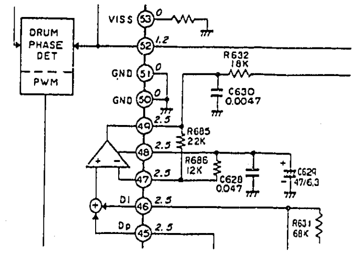
</td><td>
Q209 2SB1182
R221 1K
R220 3.9K
Q213 FMW1 (W1)
R222 330
C222 C221
PG253
To SERVO
To VID(2/2) PG253
PG254
To VID(2/2) PG254

</td></tr>
</table>

6. **MAS(SERVO) Schematic/Circuit Board** (schematic on pages 5-27~5-29 and circuit board on pages 5-68~5-71 in Service Manual No. 3227E.)
(Only the changed sections are shown in the SERVO schematic. Refer to pages 1-27~1-29 for the entire SERVO schematic and pages 1-41~1-44 for the entire MAS circuit board.)

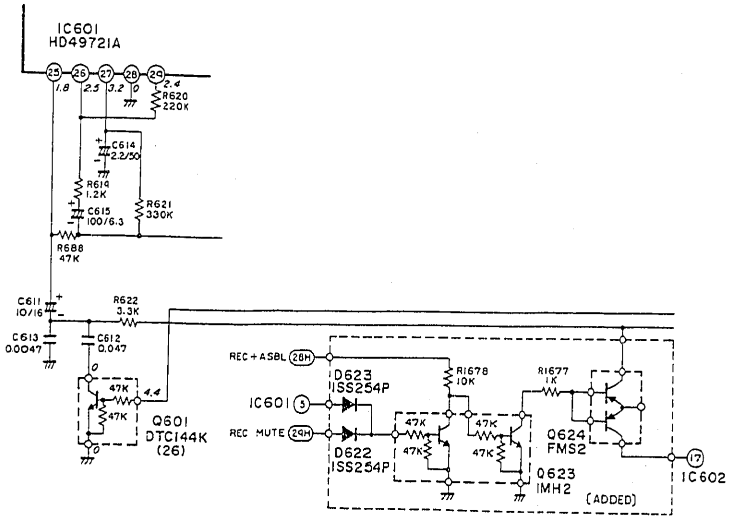
After Change	Before Change

Units with Serial No. (XXX00051 and later) already changed.
Page 5-28 (D-8)
1. To prevent power shutoff in recording pause.

After Change	Before Change
	

DRUM PHASE DET
PWM
VISS
SW30
GND
R632 [X] (CHANGED)
C630 0.0047
R685 22K
R686 12K
C628 0.047
C629 47/6.3
Di
Dp
R631 68K
R632 18K

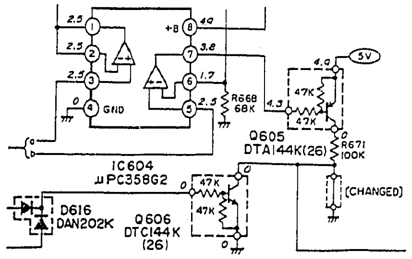
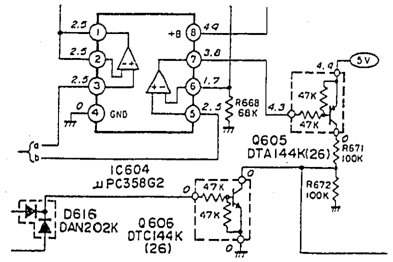
Units with Serial No. (XXX00151 and later) already changed.
Page 5-27 (D-4)
2. To prevent the CTL pulse from being lost in the insert edit mode (changed simultaneously with item 6.4).



IC601
HD49721A
R620 220K
C614 2.2/50
R619 1.2K
C615 100/6.3
R621 330K
R688 47K
C611 10/16
R622 3.3K
C613 0.0047
C612 0.047
Q601 DTC144K (26)
REC+ASBL
REC MUTE
IC601
D623 1SS254P
D622 1SS254P
R1678 10K
R1677 1K
Q624 FMS2
Q623 IMH2
(ADDED)
IC602

This diagram shows the actual circuit functionally differing from that in (D-4).

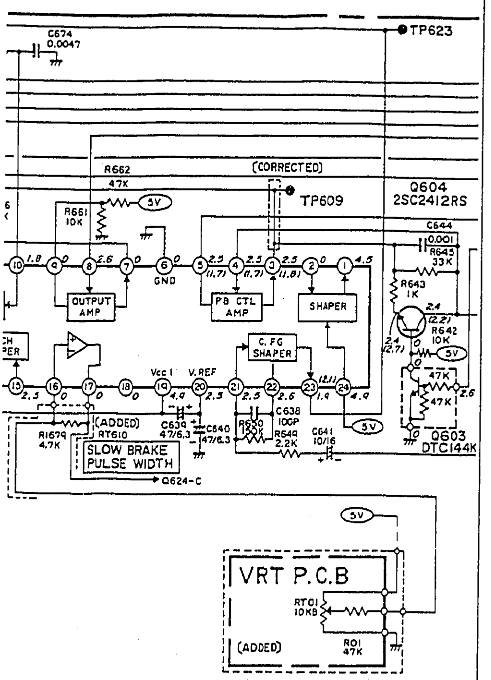
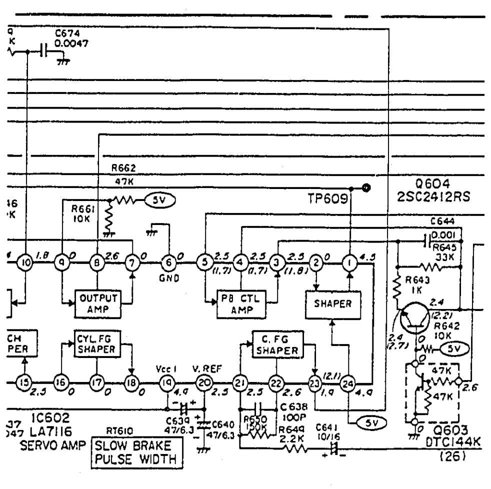
Units with Serial No. (XXX00251 and later) already changed.
Page 5-29 (A-10)
3. To prevent the capstan from rotating in reverse.

After Change	Before Change
	

+B
GND
5V
R668 68K
Q605 DTA144K(26)
R671 100K
(CHANGED)
IC604
μPC358G2
D616 DAN202K
Q606 DTC144K (26)
R672 100K

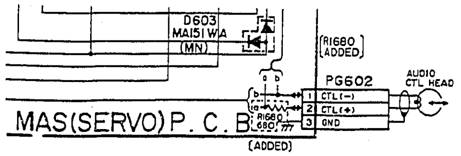
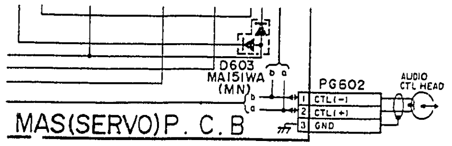
After Change	Before Change

Units with Serial No. (XXX00251 and later) already changed.
Page 5-29 (D,E-9,10)
4. To prevent any missing CTL pulses and to improve the DC offset adjustment in the assemble edit mode (changed simultaneously with item 6.2).

After Change	Before Change
	

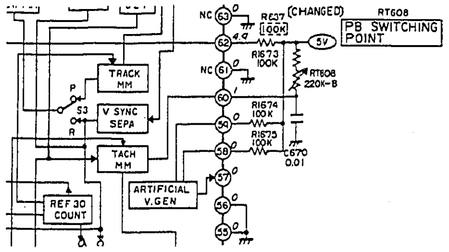
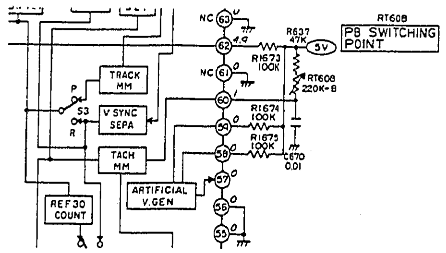
C674 0.0047
TP623
R662 47K
(CORRECTED)
TP609
Q604 2SC2412RS
R661 10K
C644 0.001
R645 33K
GND
OUTPUT AMP
PB CTL AMP
SHAPER
R643 1K
R642 10K
C.FG SHAPER
CYL.FG SHAPER
Vcc I
V.REF
(ADDED)
RT610
R1679 4.7K
C639 47/6.3
C640
C638 100P
R649 2.2K
C641 10/16
SLOW BRAKE PULSE WIDTH
Q603 DTC144K (26)
Q624-C
IC602 LA7116 SERVO AMP
VRT P.C.B
RT01 10KB
R01 47K

Units with Serial No. (XXX00951 and later) already changed.
Page 5-29 (A-11)
5. To improve the wow when a T-160 tape is used.

After Change	Before Change
	

D603 MA151WA (MN)
R1680 (ADDED)
PG602
AUDIO CTL HEAD
CTL(-)
CTL(+)
GND
MAS(SERVO) P. C. B
R1680 680
(ADDED)

Units with Serial No. (XXX00951 and later) already changed.
Page 5-28 (D-8)
6. To improve the switching point adjustment range.

After Change	Before Change
	

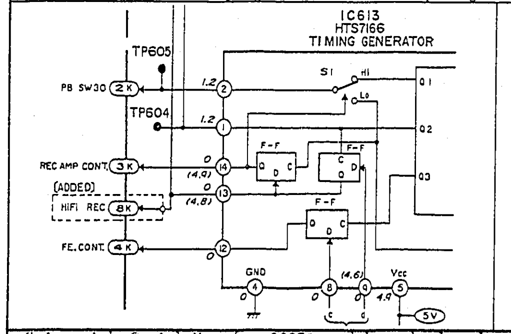
NC
R637 (CHANGED) 100K
RT608
PB SWITCHING POINT
5V
R1673 100K
RT608 220K-B
TRACK MM
V SYNC SEPA
TACH MM
REF 30 COUNT
ARTIFICIAL V.GEN
R1674 100K
R1675 100K
C670 0.01
R637 47K

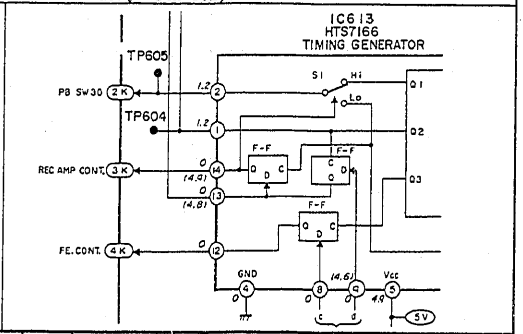
After Change	Before Change

Units with Serial No. (XXX01351 and later) already changed.

Page 5-27 (B-1)

7. To prevent interruption of Hi-Fi sound (change simultaneously with 5.2).


IC613
HTS7166
TIMING GENERATOR
TP605
TP604
PB SW30 2K
REC AMP CONT. 3K
(ADDED)
HiFi REC 8K
FE.CONT. 4K
S1
Hi
Lo
F-F
GND
Vcc
5V
Q1
Q2
Q3

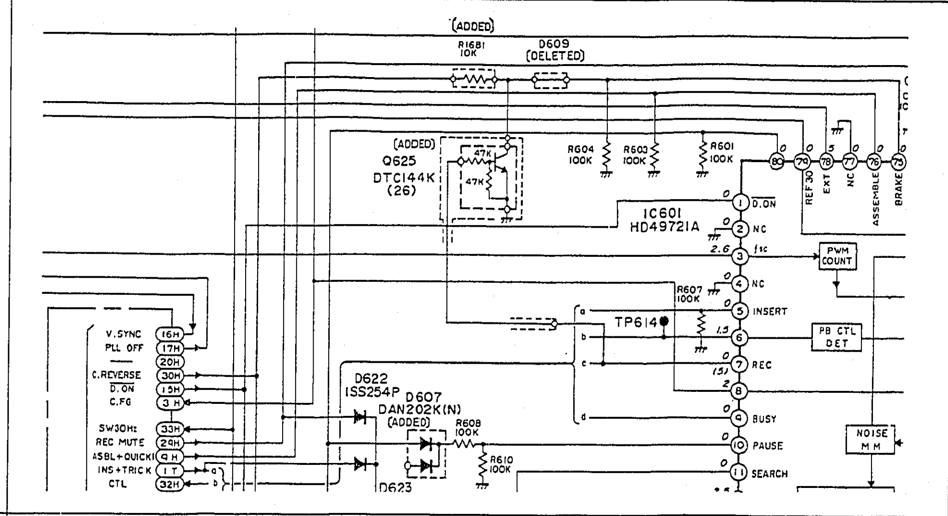

IC613
HTS7166
TIMING GENERATOR
TP605
TP604
PB SW30 2K
REC AMP CONT. 3K
FE.CONT. 4K
S1
Hi
Lo
F-F
GND
Vcc
5V
Q1
Q2
Q3

Units with Serial No. (XXX02251 and later) already changed.

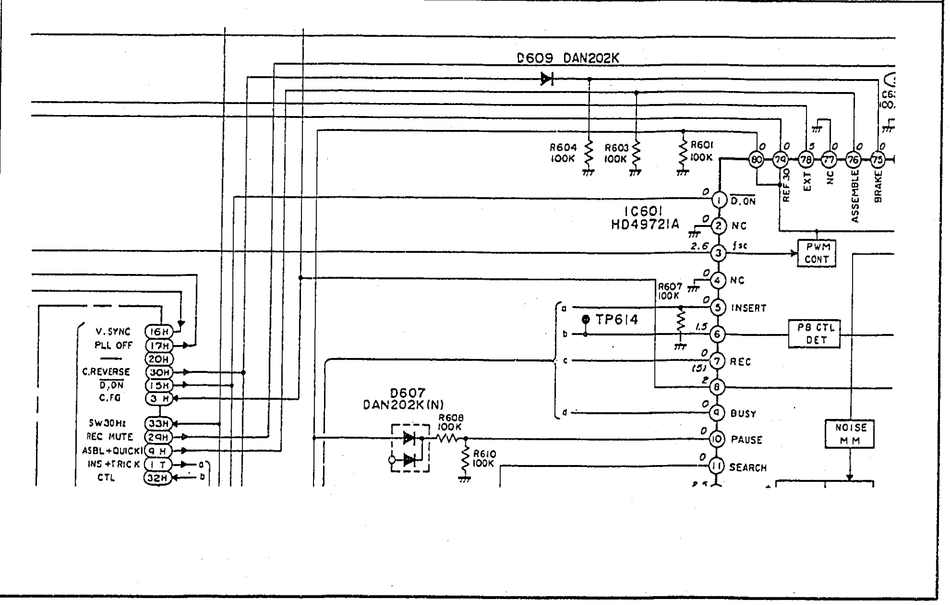
Page 5-28 (E-5)

8. To prevent one shot of CTL pulses from being missed in the AUTO EDIT mode.

After Correction


(ADDED)
R1681 10K
D609 (DELETED)
(ADDED)
Q625
DTC144K
(26)
47K
R604 100K
R603 100K
R601 100K
IC601
HD49721A
D.ON
NC
fsc
PWM COUNT
INSERT
TP614
PB CTL DET
REC
BUSY
PAUSE
SEARCH
D622
1SS254P
D607
DAN202K(N)
(ADDED)
R608 100K
R610 100K
D623
NOISE MM
REF 30
EXT
NC
ASSEMBLE
BRAKE
V.SYNC 16H
PLL OFF 17H
20H
C.REVERSE 30H
D.ON 15H
C.FG 3H
SW30Hz 33H
REC MUTE 29H
ASBL+QUICK 9H
INS+TRICK 1T
CTL 32H

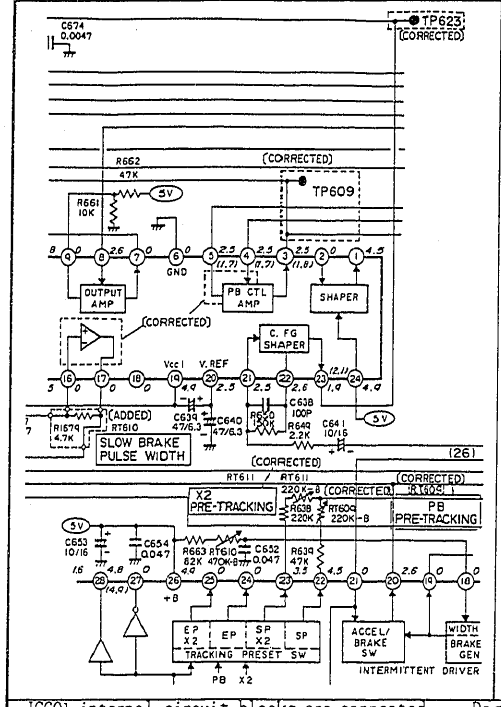
Before Correction

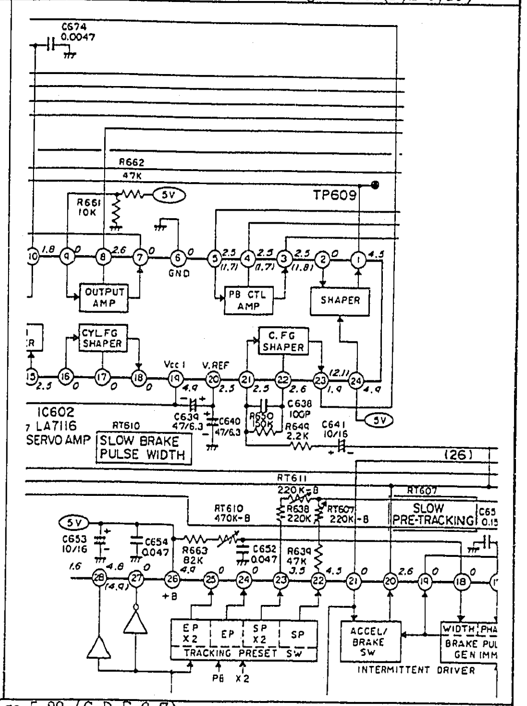

D609 DAN202K
R604 100K
R603 100K
R601 100K
IC601
HD49721A
D.ON
NC
fsc
PWM CONT
INSERT
TP614
PB CTL DET
REC
BUSY
PAUSE
SEARCH
D607
DAN202K(N)
R608 100K
R610 100K
NOISE MM
REF 30
EXT
NC
ASSEMBLE
BRAKE
V.SYNC 16H
PLL OFF 17H
20H
C.REVERSE 30H
D.ON 15H
C.FG 3H
SW30Hz 33H
REC MUTE 29H
ASBL+QUICK 9H
INS+TRICK 1T
CTL 32H

(The following shows the corrections of the SERVO schematic. Refer to pages 1-27~1-29 for the entire SERVO schematic.)

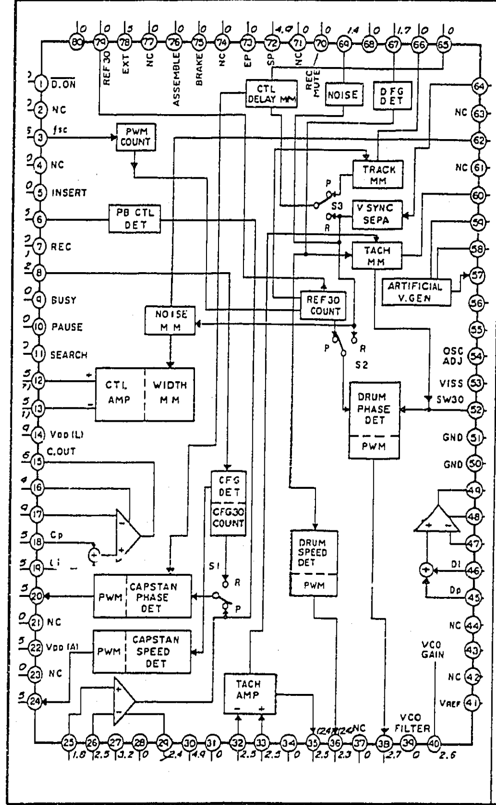
After Correction	Before Correction

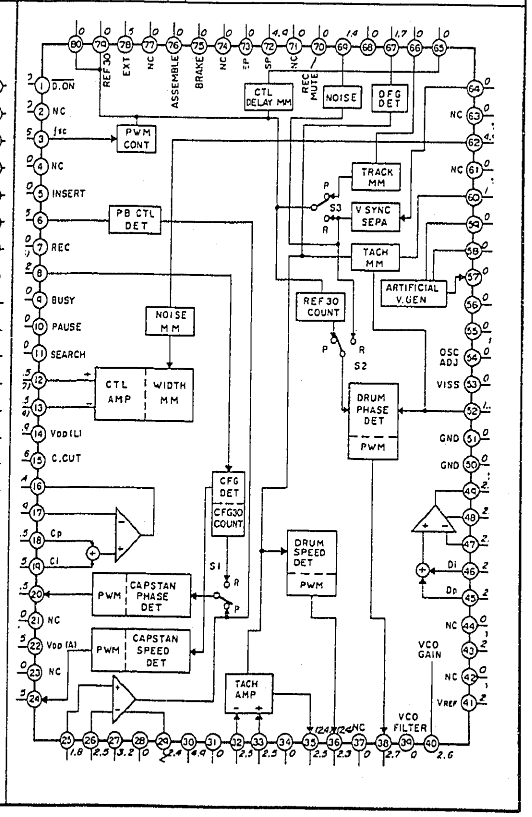
9. IC602 internal circuit blocks and its peripheral circuits are corrected. Page 5-29 (D,E-9,10)


C674 0.0047
TP623 (CORRECTED)
R662 47K
(CORRECTED)
TP609
R661 10K
5V
GND
OUTPUT AMP
PB CTL AMP
SHAPER
(CORRECTED)
C.FG SHAPER
Vcc1
V.REF
(ADDED) RT610
R1579 4.7K
SLOW BRAKE PULSE WIDTH
C639
C640
C638 100P
R649 2.2K
C641 10/16
(CORRECTED)
(26)
RT611 / RT611
(CORRECTED)
X2 PRE-TRACKING
PB PRE-TRACKING
C653 10/16
C654 0.047
R663 82K
C652 0.047
R639 47K
+B
EP X2
EP
SP X2
SP
TRACKING PRESET SW
PB X2
ACCEL/BRAKE SW
WIDTH BRAKE GEN
INTERMITTENT DRIVER


C674 0.0047
R662 47K
TP609
R661 10K
5V
GND
OUTPUT AMP
PB CTL AMP
SHAPER
CYL.FG SHAPER
C.FG SHAPER
Vcc1
V.REF
IC602
LA7116
SERVO AMP
RT610
SLOW BRAKE PULSE WIDTH
C638 100P
R649 2.2K
C641 10/16
(26)
RT611
RT610 470K-B
R638 220K
RT607 220K-B
SLOW PRE-TRACKING
C653 10/16
C654 0.047
R663 82K
C652 0.047
R639 47K
+B
EP X2
EP
SP X2
SP
TRACKING PRESET SW
PB X2
ACCEL/BRAKE SW
WIDTH BRAKE PULSE GEN
INTERMITTENT DRIVER

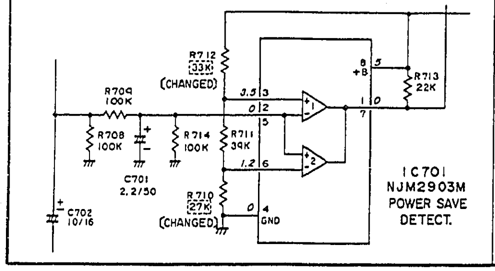
IC601 internal circuit blocks are corrected. Page 5-28 (C,D,E-6,7)

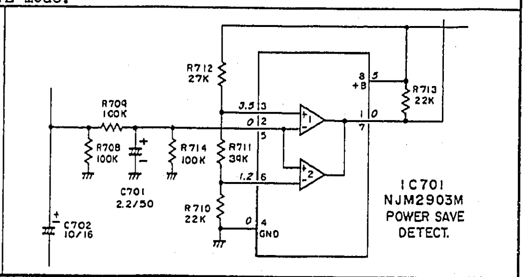

D.ON
NC
fsc
INSERT
REC
BUSY
PAUSE
SEARCH
VDD (L)
C.OUT
Cp
Ci
NC
VDD (A)
REF 30
EXT
ASSEMBLE
BRAKE
CTL DELAY MM
REC MUTE
NOISE
DFG DET
PWM COUNT
TRACK MM
S3
V SYNC SEPA
PB CTL DET
TACH MM
ARTIFICIAL V.GEN
REF 30 COUNT
NOISE MM
S2
OSC ADJ
VISS
SW30
CTL AMP
WIDTH MM
DRUM PHASE DET
PWM
GND
CFG DET
CFG30 COUNT
DRUM SPEED DET
S1
Di
Dp
CAPSTAN PHASE DET
CAPSTAN SPEED DET
VCO GAIN
TACH AMP
VCO FILTER
VREF


D.ON
NC
fsc
INSERT
REC
BUSY
PAUSE
SEARCH
VDD (L)
C.OUT
Cp
Ci
NC
VDD (A)
REF 30
EXT
ASSEMBLE
BRAKE
CTL DELAY MM
REC MUTE
NOISE
DFG DET
PWM CONT
TRACK MM
S3
V SYNC SEPA
PB CTL DET
TACH MM
ARTIFICIAL V.GEN
REF 30 COUNT
NOISE MM
S2
OSC ADJ
VISS
CTL AMP
WIDTH MM
DRUM PHASE DET
PWM
GND
CFG DET
CFG30 COUNT
DRUM SPEED DET
S1
Di
Dp
CAPSTAN PHASE DET
CAPSTAN SPEED DET
VCO GAIN
TACH AMP
VCO FILTER
VREF

7. **MAS(JACK) Schematic/Circuit Board** (schematic on pages 5-30 and circuit board on pages 5-68~5-71 in Service Manual No. 3227E.)
(Only the changed sections are shown in the JACK schematic. Refer to pages 1-41~1-44 for the entire MAS circuit board.)

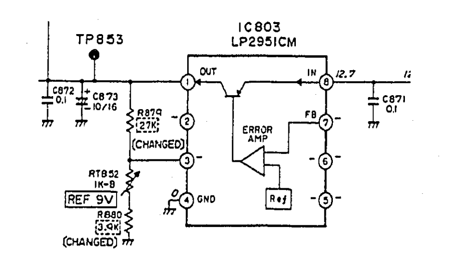
After Change	Before Change
Units with Serial No. (XXX02251 and later) already changed. Page 5-30 (A,B-3) 1. To improve the threshold level in the POWER SAVE mode.	

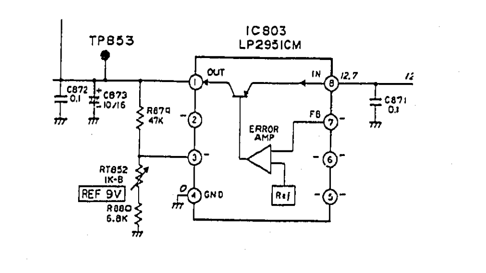

R712
33K
(CHANGED)
R709
100K
R708
100K
R714
100K
R711
39K
C701
2.2/50
R710
27K
(CHANGED)
C702
10/16
R713
22K
+B
GND
IC701
NJM2903M
POWER SAVE
DETECT.


R712
27K
R709
100K
R708
100K
R714
100K
R711
39K
C701
2.2/50
R710
22K
C702
10/16
R713
22K
+B
GND
IC701
NJM2903M
POWER SAVE
DETECT.

8. **MAS(REG) Schematic/Circuit Board** (schematic on pages 5-31 and circuit board on pages 5-68~5-71 in Service Manual No. 3227E.)
(Only the changed sections are shown in the REG schematic. Refer to pages 1-41~1-44 for the entire MAS circuit board.)

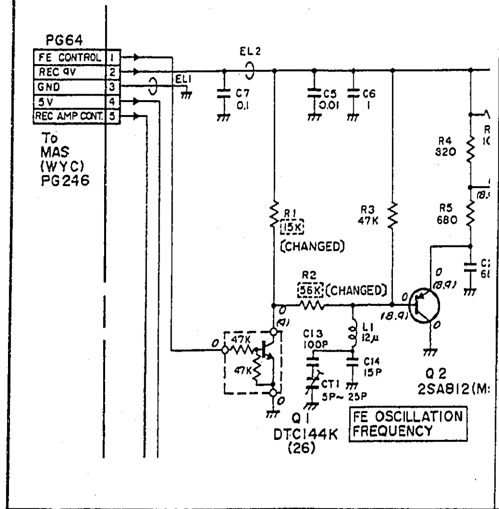
After Change	Before Change
Units with Serial No. (XXX00751 and later) aleady changed. Page 5-31 (D-5,6) To improve the REF 9V adjustment range.	

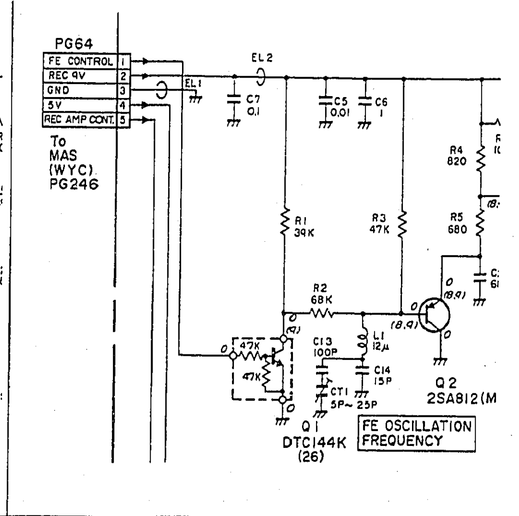

TP853
IC803
LP2951CM
C872
0.1
C873
10/16
R879
27K
(CHANGED)
RT852
1K-B
REF 9V
R880
3.9K
(CHANGED)
OUT
IN
12.7
FB
ERROR AMP
GND
Ref
C871
0.1


TP853
IC803
LP2951CM
C872
0.1
C873
10/16
R879
47K
RT852
1K-B
REF 9V
R880
6.8K
OUT
IN
12.7
FB
ERROR AMP
GND
Ref
C871
0.1

9. **IPP Schematic** (schematic on page 5-32 and circuit board on page 5-71 in Service Manual No. 3227E.)
(Only the changed sections are shown in the IPP schematic.)

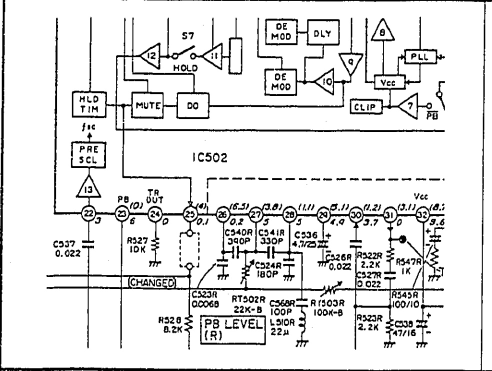
After Change	Before Change
Units with Serial No. (XXX02251 and later) aleady changed. Page 5-32 (D-9,10) 1. To improve the oscillation on the IPP board.	

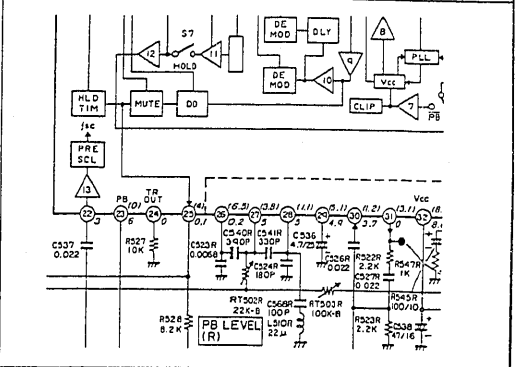

PG64
FE CONTROL 1
REC 9V 2
GND 3
5V 4
REC AMP CONT. 5
To MAS (WYC) PG246
EL1
EL2
C7
0.1
C5
0.01
C6
1
R4
820
R1
15K
(CHANGED)
R3
47K
R5
680
R2
56K
(CHANGED)
47K
47K
C13
100P
L1
12μ
C14
15P
CT1
5P~25P
Q1
DTC144K
(26)
Q2
2SA812(M
FE OSCILLATION FREQUENCY


PG64
FE CONTROL 1
REC 9V 2
GND 3
5V 4
REC AMP CONT. 5
To MAS (WYC) PG246
EL1
EL2
C7
0.1
C5
0.01
C6
1
R4
820
R1
39K
R3
47K
R5
680
R2
68K
47K
47K
C13
100P
L1
12μ
C14
15P
CT1
5P~25P
Q1
DTC144K
(26)
Q2
2SA812(M
FE OSCILLATION FREQUENCY

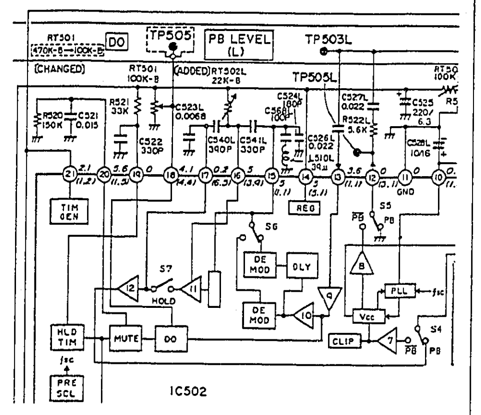
10. **MAS(AUDIO-I) Schematic/Circuit Board** (schematic on pages 5-33~5-35 and circuit board on pages 5-68~5-71 in Service Manual No. 3227E.)
(Only the changed sections are shown in the AUDIO-I schematic. Refer to pages 1-41~1-44 for the entire MAS circuit board.)

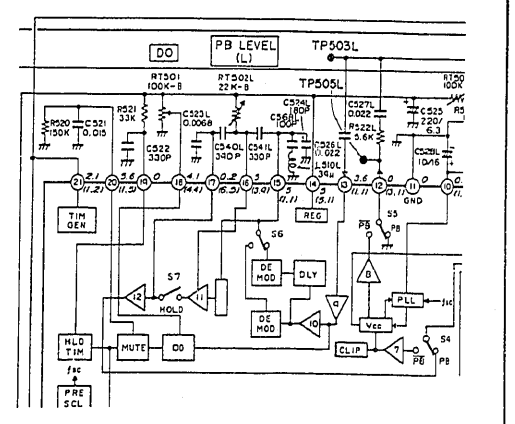
After Change	Before Change
Units with Serial no. (XXX00151 and later) already changed. Page 5-34 (D-7) 1. To change to manual switching between Hi-Fi and normal.	


S7
HOLD
DE MOD
DLY
PLL
Vcc
HLD TIM
MUTE
DO
CLIP
PB
fsc
PRE SCL
IC502
PB
TR OUT
Vcc
C537
0.022
R527
10K
(CHANGED)
C540R
390P
C541R
330P
C536
4.7/25
C524R
180P
C526R
0.022
R522R
2.2K
R547R
1K
C527R
0.022
C523R
0.0068
RT502R
22K-B
C568R
100P
RT503R
100K-B
R545R
100/10
R528
8.2K
PB LEVEL (R)
L510R
22μ
R523R
2.2K
C538
47/16

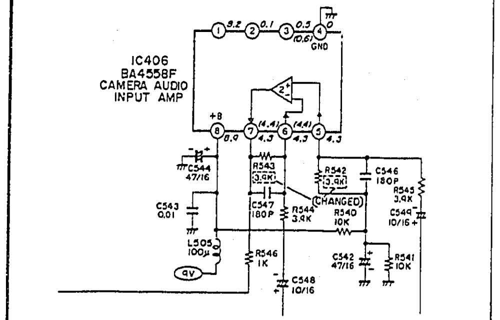

S7
HOLD
DE MOD
DLY
PLL
Vcc
HLD TIM
MUTE
DO
CLIP
PB
fsc
PRE SCL
PB
TR OUT
Vcc
C537
0.022
R527
10K
C523R
0.0068
C540R
390P
C541R
330P
C536
4.7/25
C524R
180P
C526R
0.022
R522R
2.2K
R547R
1K
C527R
0.022
RT502R
22K-B
C568R
100P
RT503R
100K-B
R545R
100/10
R528
8.2K
PB LEVEL (R)
L510R
22μ
R523R
2.2K
C538
47/16

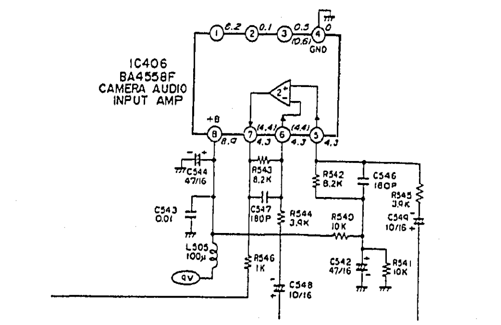
Units with Serial No. (XXX01255 and later) already changed. Page 5-34 (E-7) 2. To improve the audio level adjustment range.	


RT501
470K-B→100K-B
(CHANGED)
DO
TP505
(ADDED)
PB LEVEL (L)
TP503L
RT501
100K-B
RT502L
22K-B
TP505L
R520
150K
C521
0.015
R521
33K
C522
330P
C523L
0.0068
C540L
390P
C541L
330P
C524L
180P
C568L
100P
C526L
0.022
L510L
39μ
C527L
0.022
R522L
5.6K
C525
220/6.3
C528L
10/16
TIM GEN
REG
GND
S5
S6
S7
HOLD
DE MOD
DLY
PLL
fsc
Vcc
HLD TIM
MUTE
DO
CLIP
S4
PB
PRE SCL
IC502


DO
PB LEVEL (L)
TP503L
RT501
100K-B
RT502L
22K-B
TP505L
R520
150K
C521
0.015
R521
33K
C522
330P
C523L
0.0068
C540L
390P
C541L
330P
C524L
180P
C568L
100P
C526L
0.022
L510L
39μ
C527L
0.022
R522L
5.6K
C525
220/6.3
C528L
10/16
TIM GEN
REG
GND
S5
S6
S7
HOLD
DE MOD
DLY
PLL
fsc
Vcc
HLD TIM
MUTE
DO
CLIP
S4
PB
PRE SCL

Units with Serial No. (XXX01855 and later) already changed. Page 5-34 (B-8) 3. To improve the microphone gain.	


IC406
BA4558F
CAMERA AUDIO
INPUT AMP
GND
+B
C544
47/16
R543
3.9K
R542
3.9K
(CHANGED)
C546
180P
R545
3.9K
C543
0.01
C547
180P
R544
3.9K
R540
10K
C549
10/16
L505
100μ
9V
R546
1K
C548
10/16
C542
47/16
R541
10K

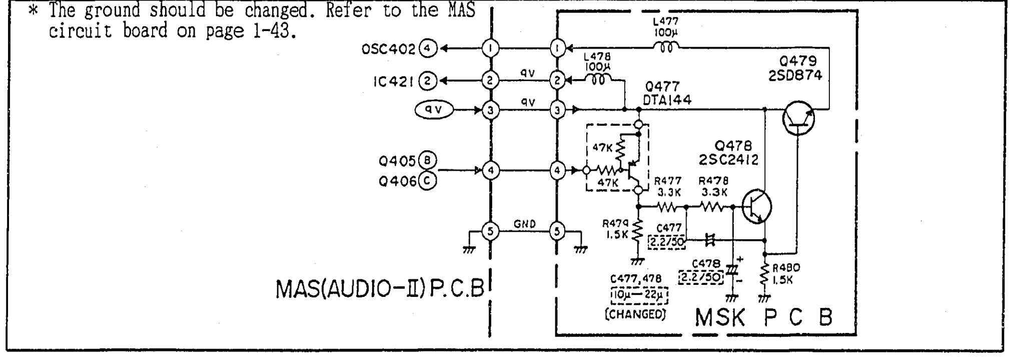

IC406
BA4558F
CAMERA AUDIO
INPUT AMP
GND
+B
C544
47/16
R543
8.2K
R542
8.2K
C546
180P
R545
3.9K
C543
0.01
C547
180P
R544
3.9K
R540
10K
C549
10/16
L505
100μ
9V
R546
1K
C548
10/16
C542
47/16
R541
10K

11. MSK Schematic/Circuit Board

(An MSK board is added to the AUDIO-II circuit. Refer to page 1-41 for the wire connection between the MSK and MAS boards.)

Units with Serial No. (XXX00551 and later) already changed. 1. To prevent pop noise in the linear audio mode (an MSK board is added).	Units with Serial No. (XXX01851 and later) already changed. 2. To prevent squeaking noise (C477 and C478 changed) (changed simultaneously with 12.2).

* The ground should be changed. Refer to the MAS circuit board on page 1-43.

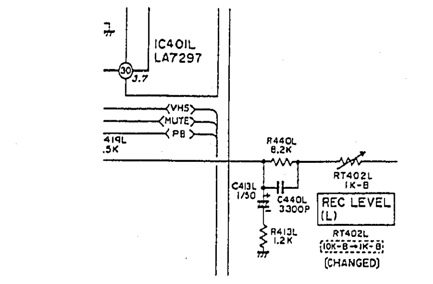

OSC402 ④
IC421 ②
9V
Q405 Ⓑ
Q406 Ⓒ
L477 100µ
L478 100µ
Q477 DTA144
Q479 2SD874
Q478 2SC2412
47K
47K
R477 3.3K
R478 3.3K
R479 1.5K
C477 2.2/50
C478
R480 1.5K
C477,478 10µ→22µ
(CHANGED)
GND
MAS(AUDIO-II) P.C.B
MSK P C B

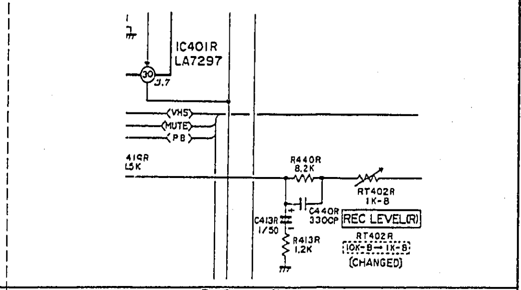
12. MAS(AUDIO-II) Schematic/Circuit Board (schematic on pages 5-36~5-38 and circuit board on pages 5-68 ~5-71 in Service Manual No. 3227E.)

(Only the changed sections are shown in the AUDIO-II schematic. Refer to pages 1-30~1-32 for the entire schematic. Refer to pages 1-41~1-44 for the MAS circuit board.)

Units with Serial no. (XXX01255 and later) already changed.
Page 5-37 (D-6)/(B-6)

1. To improve the audio level adjustment range.

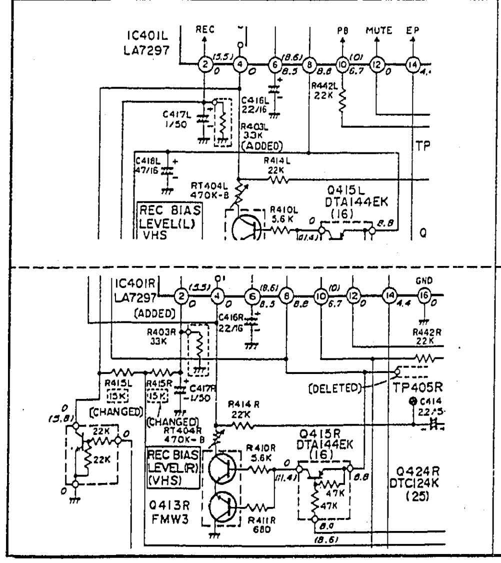

IC401L LA7297
VHS
MUTE
PB
R440L 8.2K
RT402L 1K-B
C413L 1/50
C440L 3300P
REC LEVEL (L)
R413L 1.2K
RT402L 10K-B→1K-B
(CHANGED)

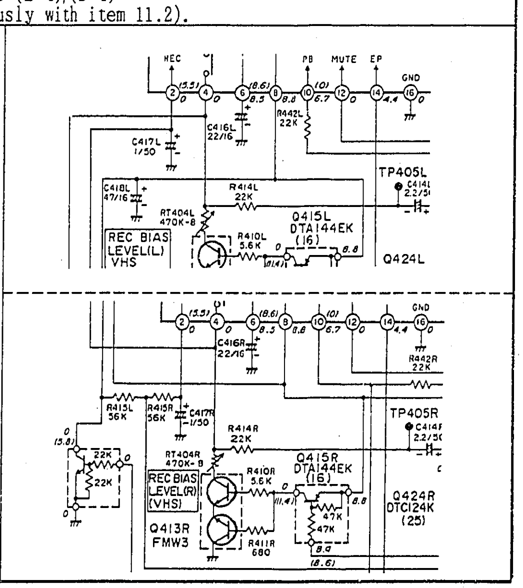

IC401R LA7297
VHS
MUTE
PB
R440R 8.2K
RT402R 1K-B
C413R 1/50
C440R 3300P
REC LEVEL(R)
R413R 1.2K
RT402R 10K-B→1K-B
(CHANGED)

After Change	Before Change

Units with Serial No. (XXX01851 and later) already changed.
Page 5-36 (B-4)/(D-4)

2. To prevent squeaking noise (changed simultaneously with item 11.2).

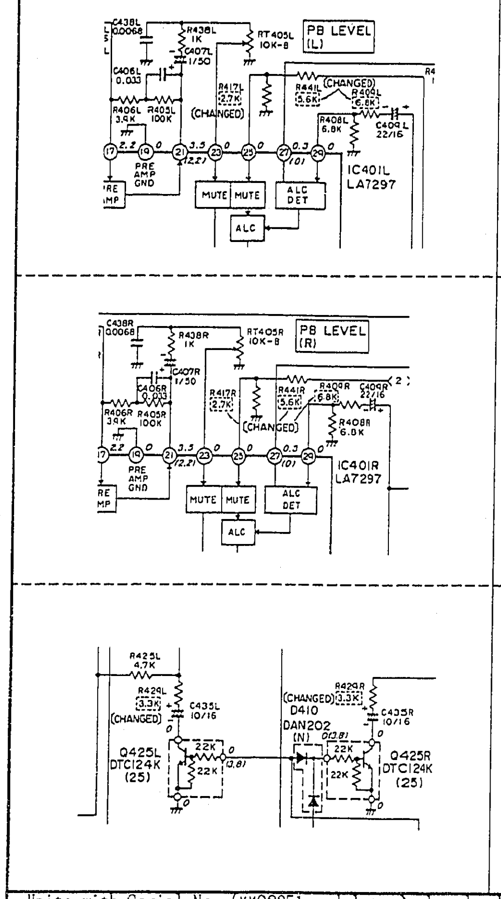

IC401L LA7297
REC
PB
MUTE
EP
C417L 1/50
C416L 22/16
R442L 22K
R403L 33K
(ADDED)
C418L 47/16
RT404L 470K-B
R414L 22K
Q415L DTA144EK
REC BIAS LEVEL(L) VHS
R410L 5.6K
TP
IC401R LA7297
(ADDED)
R403R 33K
C416R 22/16
R442R 22K
R415L 15K
R415R 15K
(CHANGED)
C417R 1/50
RT404R 470K-B
R414R 22K
(DELETED)
TP405R
Q415R DTA144EK
R410R 5.6K
REC BIAS LEVEL(R) (VHS)
Q413R FMW3
R411R 680
47K
47K
Q424R DTC124K

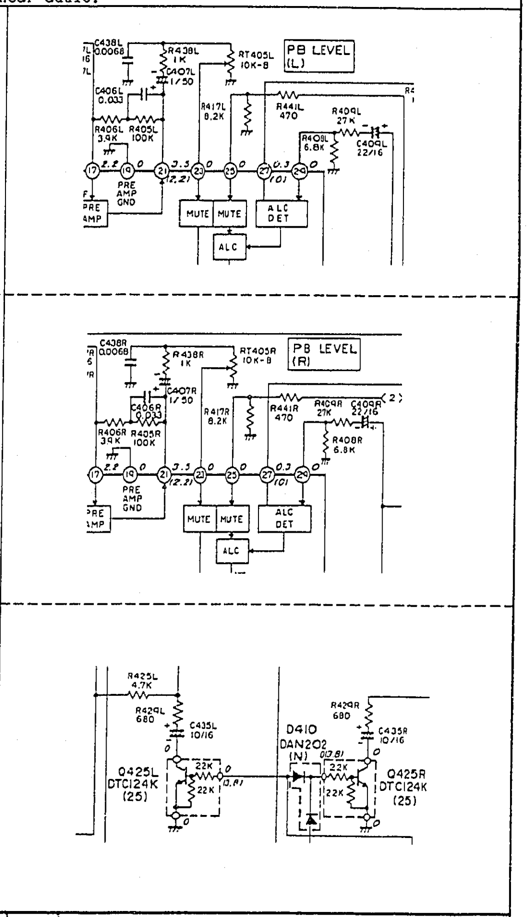

REC
PB
MUTE
EP
GND
C417L 1/50
C416L 22/16
R442L 22K
TP405L
C418L 47/16
RT404L 470K-B
R414L 22K
Q415L DTA144EK
REC BIAS LEVEL(L) VHS
R410L 5.6K
Q424L
C416R 22/16
R442R 22K
R415L 56K
R415R 56K
C417R 1/50
RT404R 470K-B
R414R 22K
TP405R
Q415R DTA144EK
R410R 5.6K
REC BIAS LEVEL(R) (VHS)
Q413R FMW3
R411R 680
47K
47K
Q424R DTC124K

After Change	Before Change

Units with Serial No. (XXX02051 and later) already changed.
Page 5-37 (E-5,6)/(C-5,6)/(D-6,7)

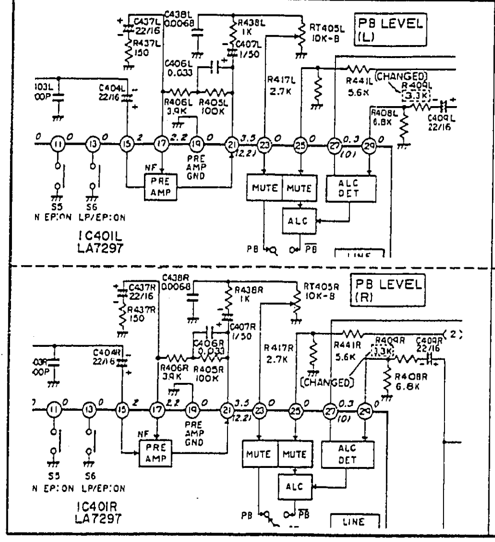
3. To improve the ALC and distortion factor of linear audio.

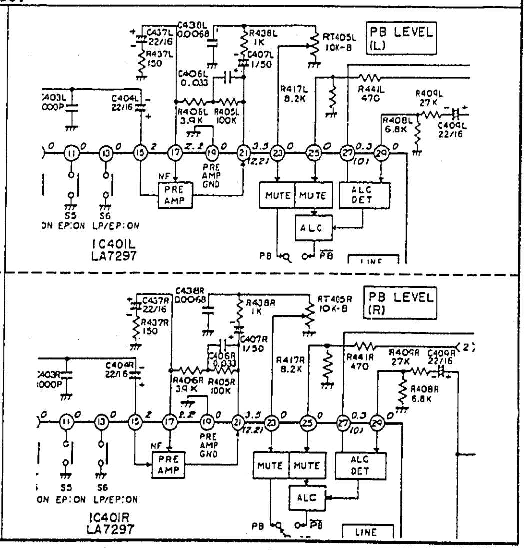

PB LEVEL (L)
RT405L 10K-B
R438L 1K
C407L 1/50
R441L 5.6K
R405L 6.8K
(CHANGED)
R417L 2.7K
R408L 6.8K
C409L 22/16
IC401L LA7297
PRE AMP GND
MUTE
ALC DET
ALC
PB LEVEL (R)
RT405R 10K-B
R438R 1K
C407R 1/50
R441R 5.6K
R409R 6.8K
R417R 2.7K
R408R 6.0K
IC401R LA7297
R425L 4.7K
R429L 3.3K
(CHANGED)
C435L 10/16
R429R 3.3K
C435R 10/16
D410 DAN202
Q425L DTC124K
Q425R DTC124K
22K


PB LEVEL (L)
RT405L 10K-B
R438L 1K
C407L 1/50
R417L 8.2K
R441L 470
R409L 27K
R408L 6.8K
C409L 22/16
PRE AMP GND
MUTE
ALC DET
ALC
PB LEVEL (R)
RT405R 10K-B
R438R 1K
C407R 1/50
R417R 8.2K
R441R 470
R409R 27K
R408R 6.8K
R425L 4.7K
R429L 680
C435L 10/16
R429R 680
C435R 10/16
D410 DAN202
Q425L DTC124K
Q425R DTC124K
22K

Units with Serial No. (XX02251 and later) already changed.
Page 5-37 (E-5,6)/(C-5,6)

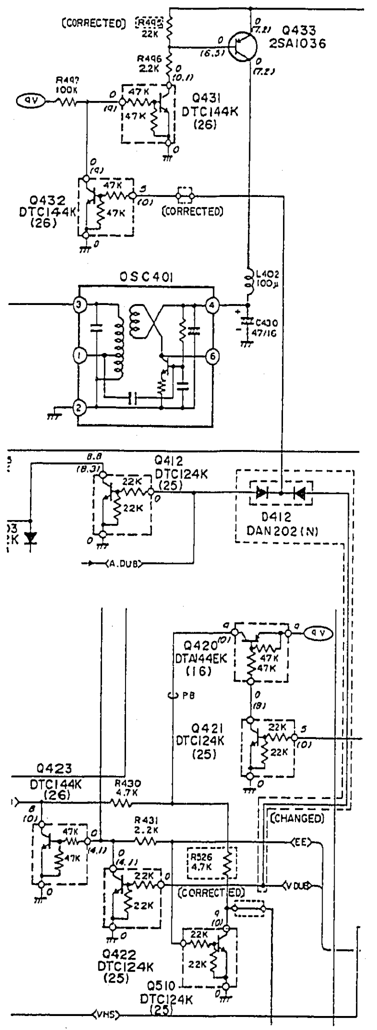
4. To improve the distortion factor of linear audio.

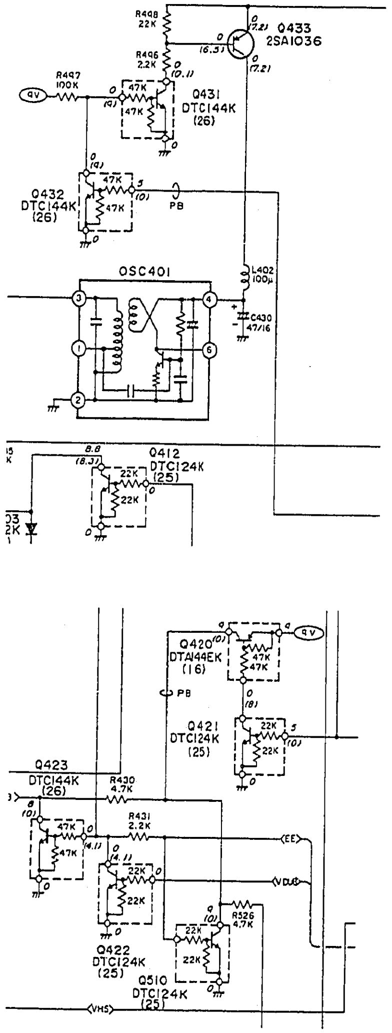

PB LEVEL (L)
RT405L 10K-B
C437L 22/16
R437L 150
R438L 1K
C407L 1/50
R417L 2.7K
R441L 5.6K
(CHANGED)
C404L 22/16
NF PRE AMP
ALC
IC401L LA7297
PB LEVEL (R)
RT405R 10K-B
C437R 22/16
R437R 150
R438R 1K
C407R 1/50
R417R 2.7K
R441R 5.6K
(CHANGED)
R408R 6.8K
C404R 22/16
IC401R LA7297
LINE


PB LEVEL (L)
RT405L 10K-B
C437L 22/16
R437L 150
R438L 1K
C407L 1/50
R417L 8.2K
R441L 470
R409L 27K
R408L 6.8K
C404L 22/16
IC401L LA7297
PB LEVEL (R)
RT405R 10K-B
C437R 22/16
R437R 150
R438R 1K
C407R 1/50
R417R 8.2K
R441R 470
R409R 27K
R408R 6.8K
C404R 22/16
IC401R LA7297
LINE

After Change	Before Change
Units with Serial No. (XXX02251 and later) already changed.	Page 5-36 (E,D-2,3)
5. To improve the full erasure operation in the assemble edit mode.	Page 5-37 (B,C-7,8)

Applies only to the B version. Changed together with system control and edit microprocessors 1037D and 1037A.

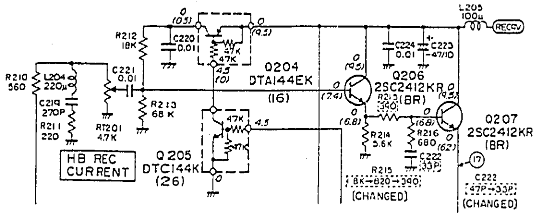

(CORRECTED)
R498 22K
Q433 2SA1036
R496 2.2K
R497 100K
Q431 DTC144K (26)
Q432 DTC144K (26)
(CORRECTED)
OSC401
L402 100μ
C430 47/16
Q412 DTC124K (25)
D412 DAN202(N)
(A.DUB)
Q420 DTA144EK (16)
PB
Q421 DTC124K (25)
Q423 DTC144K (26)
R430 4.7K
R431 2.2K
(CHANGED)
R526 4.7K
(CORRECTED)
(EE)
(DUB)
Q422 DTC124K (25)
Q510 DTC124K (25)
(VHS)


R498 22K
Q433 2SA1036
R496 2.2K
R497 100K
Q431 DTC144K (26)
Q432 DTC144K (26)
PB
OSC401
L402 100μ
C430 47/16
Q412 DTC124K (25)
Q420 DTA144EK (16)
PB
Q421 DTC124K (25)
Q423 DTC144K (26)
R430 4.7K
R431 2.2K
R526 4.7K
(EE)
(DUB)
Q422 DTC124K (25)
Q510 DTC124K (25)
(VHS)

13. VID[1/2] Schematic/Circuit Board (schematic on pages 5-39~5-41 and circuit board on pages 5-72~5-73 in Service Manual No. 3227E.)

(Only the changed sections are shown in the VID[1/2] schematic. Refer to pages 1-33~1-35 for the entire schmatic. Refer to pages 1-51~1-52 for the entire VID circuit board.)

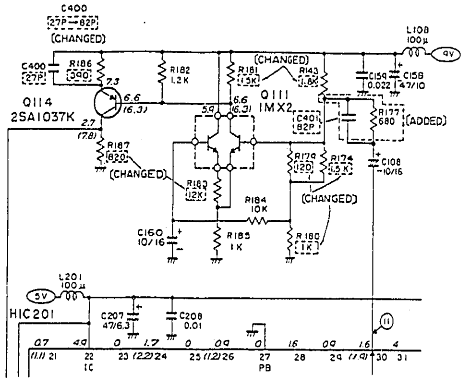
After Change	Before Change
Units with Serial No. (XXX00151 and later) already changed.	
Page 5-40 (E-7,8)	
1. To improve the recording video frequency response and compatibility and prevent the record monitoring picture from being inverted (changed simultaneously with items 15.1, 14.1 and 14.2).	

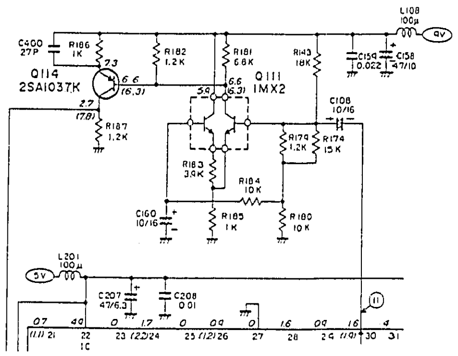

L205 100μ
(REC 9V)
R212 18K
C220 0.01
C221 0.01
Q204 DTA144EK (16)
C224 0.01
C223 47/10
Q206 2SC2412KR (BR)
R210 560
L204 220μ
C219 270P
R211 220
R213 68K
R1201 4.7K
HB REC CURRENT
Q205 DTC144K (26)
R214 5.6K
R216 680
Q207 2SC2412KR (BR)
R215
C222
(CHANGED)
(CHANGED)

Units with Serial No. (XXX02051 and later) already changed.

Page 5-40 (E,D-5,6)

2. To improve the sync expansion and the contrast (changed simultaneously with items 13.4 and 15.4).

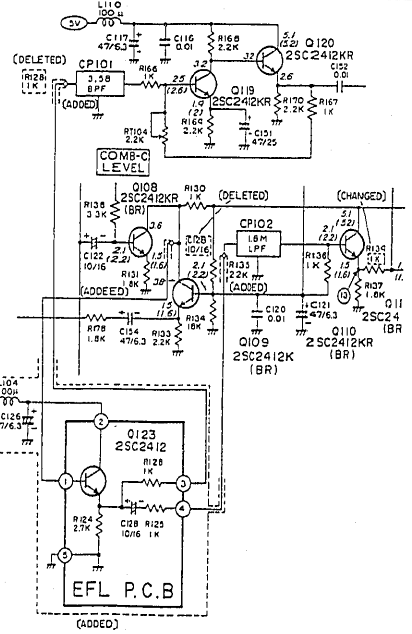

C400 (CHANGED)
L108 100μ
R186
R182 1.2K
R181
R143
(CHANGED)
C156 0.022
C158 47/10
Q114 2SA1037K
Q111 IMX2
C401
R177 680 (ADDED)
R187 (CHANGED)
R183
R179
R174
C108 10/16
(CHANGED)
R184 10K
C160 10/16
R185 1K
R180
L201 100μ
5V
HIC201
C207 47/6.3
C209 0.01
PB

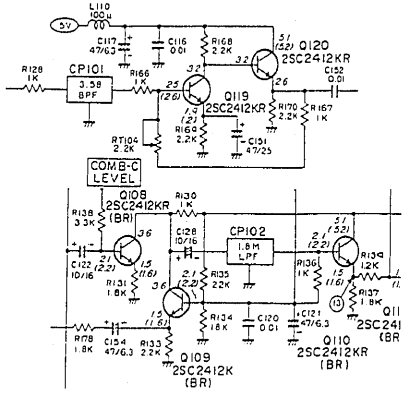

C400 27P
R186 1K
L108 100μ
R182 1.2K
R181 6.8K
R143 18K
C156 0.022
C158 47/10
Q114 2SA1037K
Q111 IMX2
C108 10/16
R187 1.2K
R179 1.2K
R174 15K
R183 3.9K
R184 10K
C160 10/16
R185 1K
R180 10K
L201 100μ
5V
C207 47/6.3
C208 0.01

Units with Serial No. (XXX02051 and later) already changed.

Page 5-39 (E,D-2)

3. To improve the Y/C separation and chroma S/N.

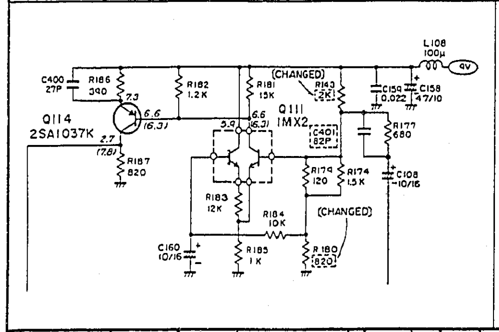

L110 100μ
5V
C117 47/6.3
C116 0.01
R168 2.2K
Q120 2SC2412KR
(DELETED)
R128 1K
CP101 3.58 BPF
R166
Q119 2SC2412KR
R170 2.2K
R167 1K
C152 0.01
(ADDED)
RT104 2.2K
R169 2.2K
C151 47/25
COMB-C LEVEL
Q108 2SC2412KR (BR)
R130 1K
(DELETED)
(CHANGED)
R138 3.3K
CP102 1.8M LPF
R136 1K
R139 12K
R137 1.8K
C122 10/16
R131 1.8K
R135 22K
(ADDED)
(ADDED)
R178 1.8K
C154 47/6.3
R133 22K
R134 18K
C120 0.01
C121 47/6.3
Q109 2SC2412K (BR)
Q110 2SC2412KR (BR)
Q11 2SC241 (BR)
L104 100μ
5V
C126 47/6.3
Q123 2SC2412
R128 1K
R124 2.7K
C128 10/16
R125 1K
EFL P.C.B
(ADDED)

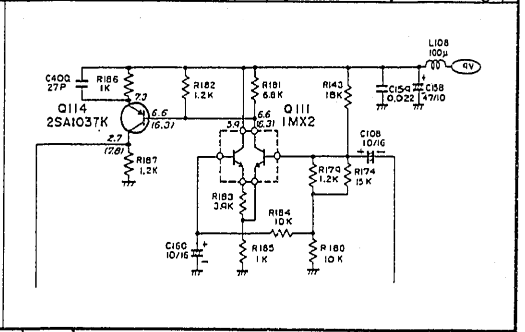

L110 100μ
5V
C117 47/6.3
C116 0.01
R168 2.2K
Q120 2SC2412KR
R128 1K
CP101 3.58 BPF
R166 1K
Q119 2SC2412KR
R170 2.2K
R167 1K
C152 0.01
RT104 2.2K
R169 2.2K
C151 47/25
COMB-C LEVEL
Q108 2SC2412KR (BR)
R130 1K
R138 3.3K
C128 10/16
CP102 1.8M LPF
R136 1K
R139 12K
R137 1.8K
C122 10/16
R131 1.8K
R135 22K
R178 1.8K
C154 47/6.3
R133 22K
R134 18K
C120 0.01
C121 47/6.3
Q109 2SC2412K (BR)
Q110 2SC2412KR (BR)
Q11 2SC241 (BR)

After Change	Before Change

Units with Serial No. (XXX02251 and later) already changed.
Page 5-40(D,E-5)

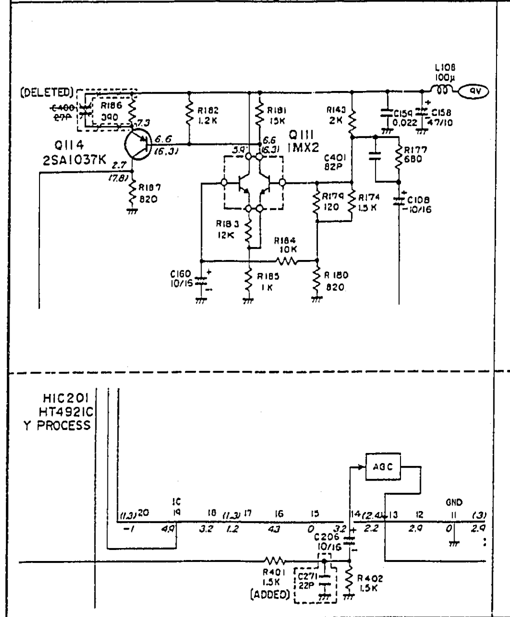
4. To improve the sync expansion and change the DC level (to improve the APL response and dynamic range).

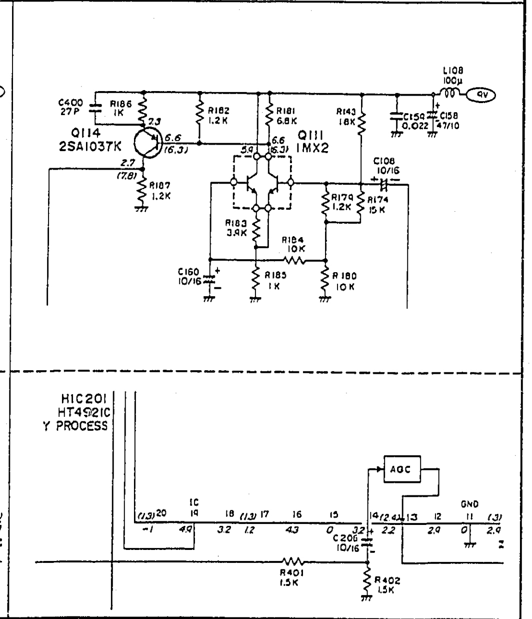

Q114
2SA1037K
Q111
IMX2
(CHANGED)
L108
9V


Q114
2SA1037K
Q111
IMX2
L108
9V

Units with Serial No. (XXX02251 and later) already changed.
Page 5-40 (D,E-5)/(C-5)

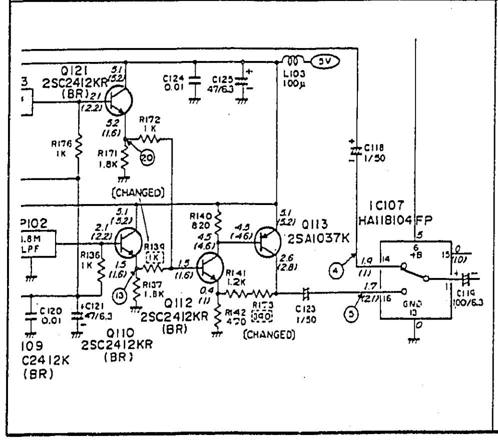
5. To reduce record peaking (changed simultaneously with items 14.5 and 15.6).

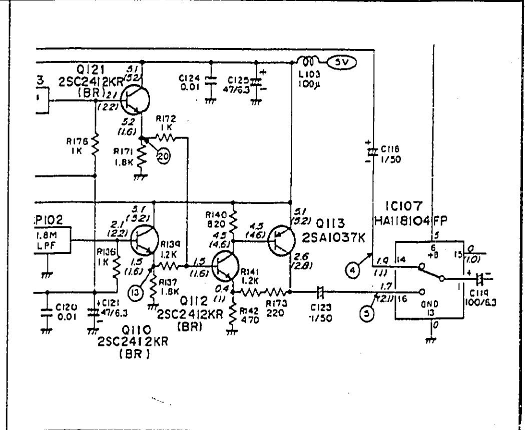

(DELETED)
Q114
2SA1037K
Q111
IMX2
HIC201
HT4921C
Y PROCESS
AGC
R401
(ADDED)


Q114
2SA1037K
Q111
IMX2
HIC201
HT4921C
Y PROCESS
AGC

Units with Serial No. (XXX02251 and later) already changed.
Page 5-39 (D-3)

6. To prevent framing from malfunction (changed simultaneously with item 2.1).


Q121
2SC2412KR
(CHANGED)
Q113
2SA1037K
IC107
HA118104FP
Q112
2SC2412KR
Q110
2SC2412KR
(BR)
5V


Q121
2SC2412KR
Q113
2SA1037K
IC107
HA118104FP
Q112
2SC2412KR
Q110
2SC2412KR
(BR)
5V

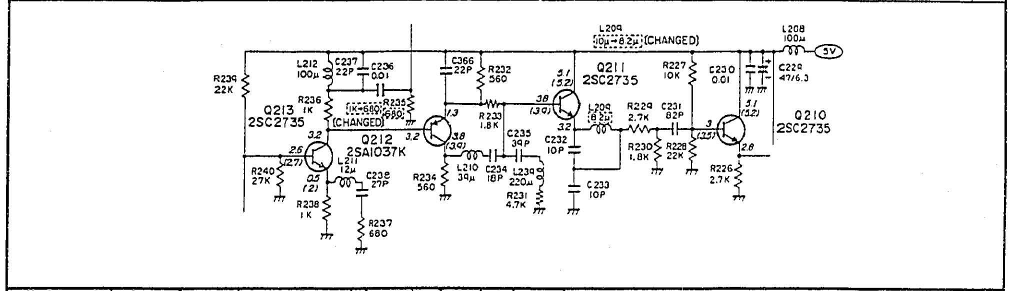
14. VID[2/2] Schematic/Circuit Board (schematic on pages 5-42～5-43 and circuit board on pages 5-72～5-73 in Service Manual No. 3227E.)

(Only the changed sections are shown in the VID[2/2] schematic. Refer to pages 1-36～1-37 for the entire schematic. Refer to pages 1-51～1-52 for the entire VID circuit board.)

After Change	Before Change

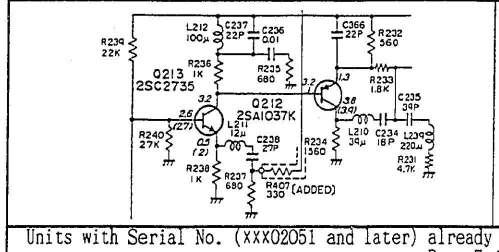
Units with Serial No. (XXX00151 and later) already changed.
Page 5-43 (D-5,6)

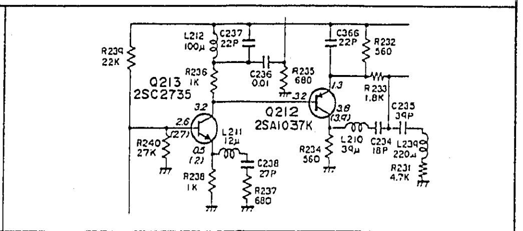
1. To improve the recording video frequency response (changed simultaneously with items 13.1 and 15.1).


(CHANGED)
Q213
2SC2735
Q212
2SA1037K
Q211
2SC2735
Q210
2SC2735
5V

Units with Serial No. (XXX00151 and later) already changed.
Page 5-43 (D-5,6)

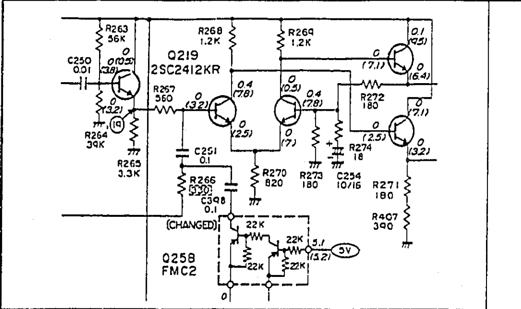
2. To prevent the record monitoring picture from being inverted (changed simultaneously with R215 changed to 390Ω in item 13.1).

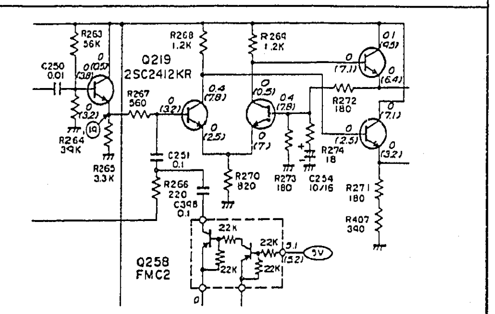

Q213
2SC2735
Q212
2SA1037K
R407
330 (ADDED)


Q213
2SC2735
Q212
2SA1037K

Units with Serial No. (XXX02051 and later) already changed.
Page 5-42 (D,E-3,4)

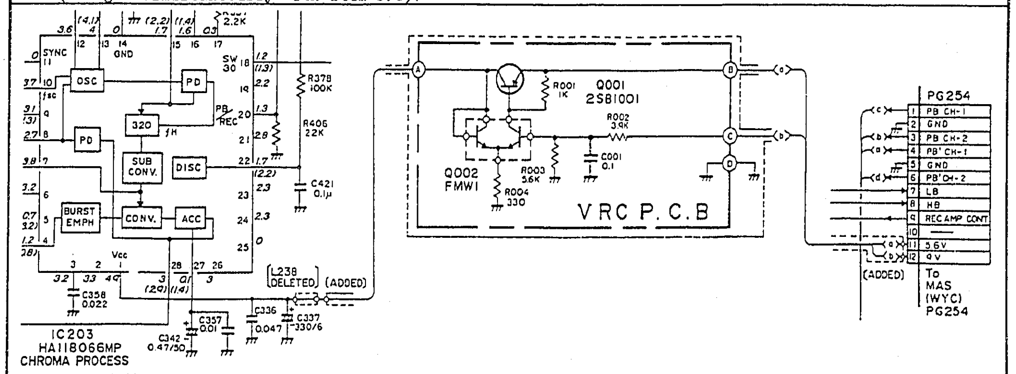
3. To improve the Y/C separation and chroma S/N.


Q219
2SC2412KR
(CHANGED)
Q258
FMC2
5V


Q219
2SC2412KR
Q258
FMC2
5V

Units with Serial No. (XXX02451 and later) already changed.
Pages 5-42 (C-3)/5-43 (A-7)

4. To prevent the drift in chroma phase across the top of the screen and stabilize the power supply (changed simultaneously with item 5.3).

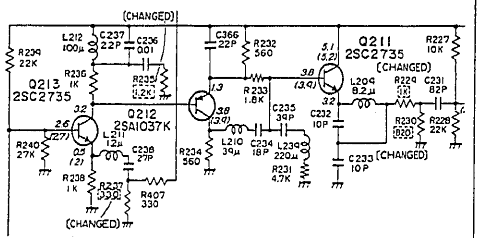

IC203
HA118066MP
CHROMA PROCESS
SYNC
OSC
PD
320
SUB CONV.
DISC
BURST EMPH
CONV.
ACC
L238
(DELETED)
(ADDED)
Q001
2SB1001
Q002
FMW1
VRC P.C.B
PG254
PB CH-1
GND
PB CH-2
PB' CH-1
GND
PB' CH-2
LB
HB
REC AMP CONT
5V
9V
(ADDED)
To MAS (WYC) PG254

After Change | Before Change

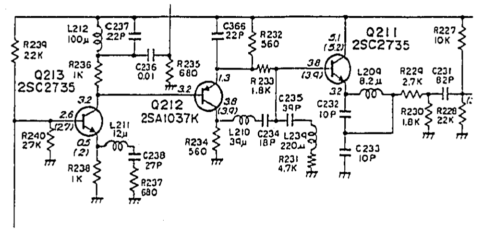
Units with Serial No. (XXX02251 and later) already changed.
Page 5-43 (D-5)

5. To improve the record peaking level (changed simultaneously with items 13.5 and 15.6).

After Change:


(CHANGED)
R239 22K
L212 100µ
C237 22P
C236 .001
R236 1K
R235 1.2K
Q213 2SC2735
Q212 2SA1037K
C366 22P
R232 560
Q211 2SC2735
(CHANGED)
R227 10K
L209 8.2µ
R229 1K
C231 82P
R233 1.8K
C235 39P
C232 10P
R230 820
R228 22K
R240 27K
L211 12µ
C238 27P
R234 560
L210 39µ
C234 18P
L239 220µ
R231 4.7K
C233 10P
(CHANGED)
R238 1K
R237 330
R407 330
(CHANGED)

Before Change:


R239 22K
L212 100µ
C237 22P
R236
C236 .001
R235 680
Q213 2SC2735
Q212 2SA1037K
C366 22P
R232 560
Q211 2SC2735
R227 10K
L209 8.2µ
R229 2.7K
C231 82P
R233 1.8K
C235 39P
C232 10P
R230 1.8K
R228 22K
R240 27K
L211 12µ
C238 27P
R234 560
L210 39µ
C234 18P
L239 220µ
R231 4.7K
C233 10P
R238 1K
R237 680

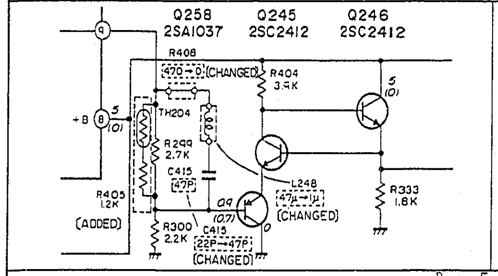
15. ENC(PB VIDEO PROCESS) Schematic/Circuit Board (schematic on pages 5-46~5-48 and circuit board on pages 5-74~5-75 in Service Manual No. 3227E.)
(Only the changed sections are in the ENC(PB VIDEO PROCESS) schematic.

After Change | Before Change

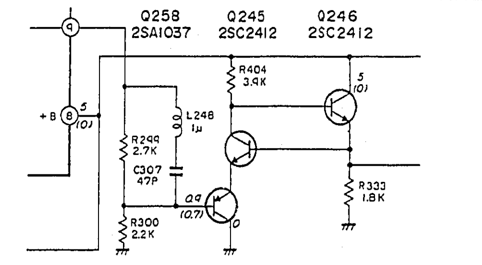
Units with Serial No. (XXX00151 and later) already changed.
Page 5-48 (C-10,16-1)

1. To improve the recording video frequency response and the temperature compensation for high-band luminance level (changed simultaneously with items 13.1 and 14.1).

After Change:

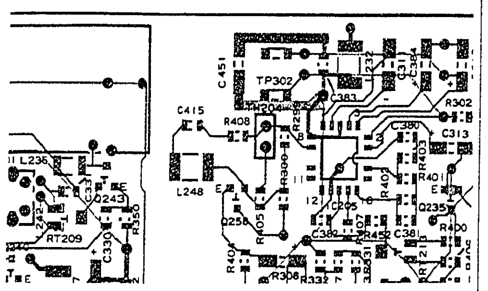

Q258 2SA1037
Q245 2SC2412
Q246 2SC2412
R408
470→0 (CHANGED)
R404 3.9K
+B
TH204
R299 2.7K
C415 47P
R405 1.2K
(ADDED)
R300 2.2K
C415 22P→47P
(CHANGED)
L248 47µ→1µ
(CHANGED)
R333 1.8K

Before Change:

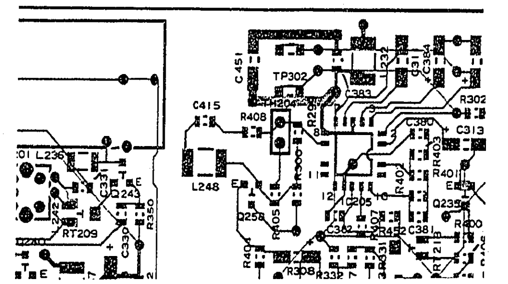

Q258 2SA1037
Q245 2SC2412
Q246 2SC2412
R404 3.9K
+B
L248 1µ
R299 2.7K
C307 47P
R300 2.2K
R333 1.8K

Page 5-75 (E-5)

After Change:


C451
TP302
C415
R408
R302
C313
L236
L248
Q243
Q258
R405
RT209
R401
Q235
R404
R400
C330
R350

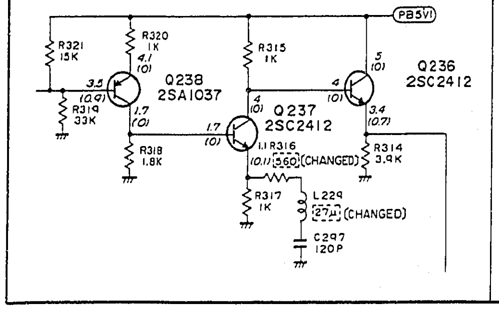
Before Change:


C451
TP302
C415
R408
R302
C313
L236
L248
Q243
Q258
RT209
R401
Q235
R404
R400
C330
R350

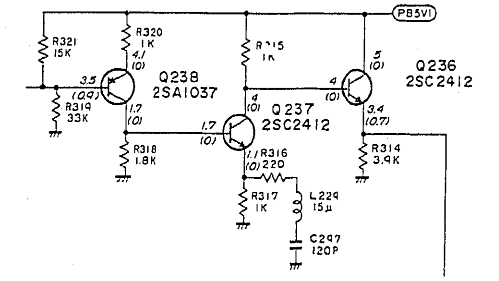
Units with Serial No. (XXX01055 and later) already changed.
Page 5-47 (D-6,7)

2. To reduce ringing.

After Change:


PB5V1
R321 15K
R320 1K
R315 1K
Q238 2SA1037
Q237 2SC2412
Q236 2SC2412
R319 33K
R318 1.8K
R316 560 (CHANGED)
R314 3.9K
R317 1K
L229 27µ (CHANGED)
C297 120P

Before Change:

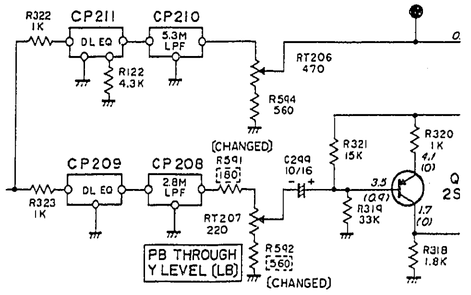

PB5V1
R321 15K
R320 1K
R315 1K
Q238 2SA1037
Q237 2SC2412
Q236 2SC2412
R319 33K
R318 1.8K
R316 220
R314 3.9K
R317 1K
L229 15µ
C297 120P

After Change | Before Change

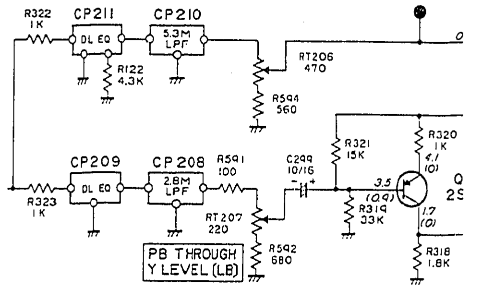
Units with Serial No. (XXX02051 and later) already changed.
Page 5-47(E-5)

4. To change the low-band video level adjustment.

After Change:


R322 1K
CP211 DL EQ
CP210 5.3M LPF
R122 4.3K
RT206 470
R594 560
(CHANGED)
CP209 DL EQ
CP208 2.8M LPF
R591 180
C299 10/16
R321 15K
R320 1K
R319 33K
R323 1K
RT207 220
PB THROUGH Y LEVEL (LB)
R592 560
(CHANGED)
R318 1.8K

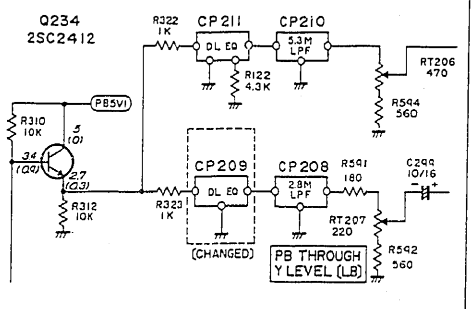
Before Change:


R322 1K
CP211 DL EQ
CP210 5.3M LPF
R122 4.3K
RT206 470
R594 560
CP209 DL EQ
CP208 2.8M LPF
R591 100
C299 10/16
R321 15K
R320 1K
R319 33K
R323 1K
RT207 220
PB THROUGH Y LEVEL (LB)
R592 680
R318 1.8K

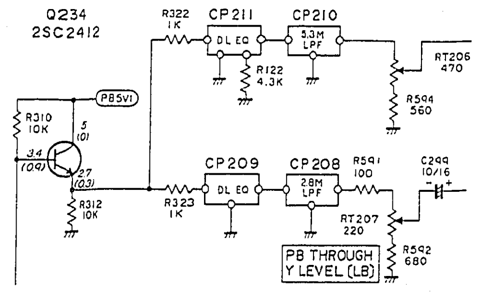
Units with Serial No. (XXX02251 and later) already changed.
Page 5-47(E-5)

5. To improve the Y/C timing.

After Change:

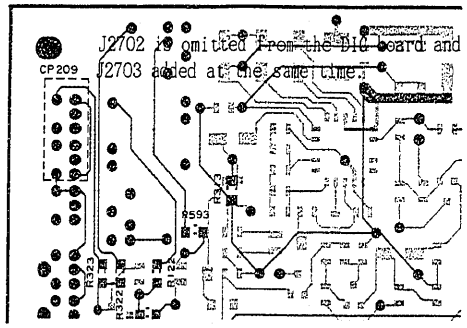

Q234 2SC2412
R322 1K
CP211 DL EQ
CP210 5.3M LPF
R122 4.3K
RT206 470
PB5V1
R310 10K
R594 560
CP209 DL EQ
CP208 2.8M LPF
R591 180
C299 10/16
R312 10K
R323 1K
(CHANGED)
RT207 220
PB THROUGH Y LEVEL (LB)
R592 560

Before Change:

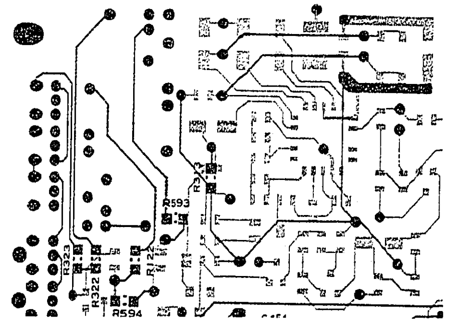

Q234 2SC2412
R322 1K
CP211 DL EQ
CP210 5.3M LPF
R122 4.3K
RT206 470
PB5V1
R310 10K
R594 560
CP209 DL EQ
CP208 2.8M LPF
R591 100
C299 10/16
R312 10K
R323 1K
RT207 220
PB THROUGH Y LEVEL (LB)
R592 680

Page 5-74(C-1)

After Change:


J2702 is omitted from the DIC board and J2703 added at the same time.
CP209
R593
R323
R322

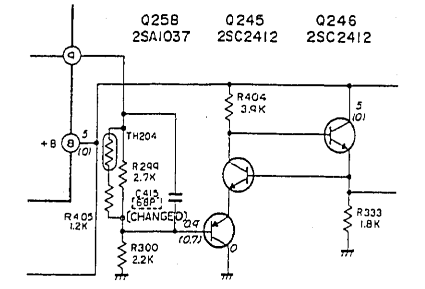
Before Change:


R593
R323
R322
R594

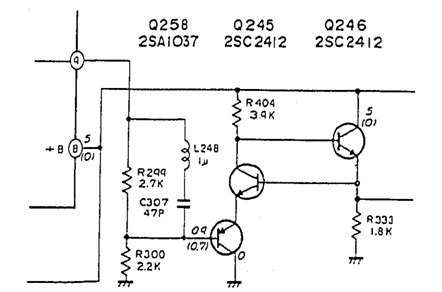
Units with Serial No. (XXX02251 and later) already changed.
Page 5-48 (C-10)

6. To improve the playback peaking level (changed simultaneously with items 13.5 and 14.5).

After Change:


Q258 2SA1037
Q245 2SC2412
Q246 2SC2412
R404 3.9K
+B
TH204
R299 2.7K
C415 68P
(CHANGED)
R405 1.2K
R300 2.2K
R333 1.8K

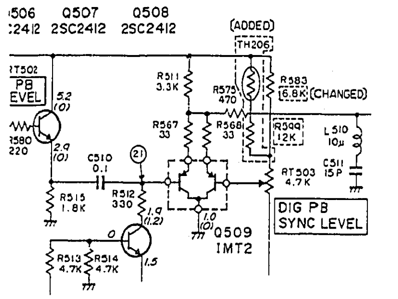
Before Change:


Q258 2SA1037
Q245 2SC2412
Q246 2SC2412
R404 3.9K
+B
L248 1µ
R299 2.7K
C307 47P
R300 2.2K
R333 1.8K

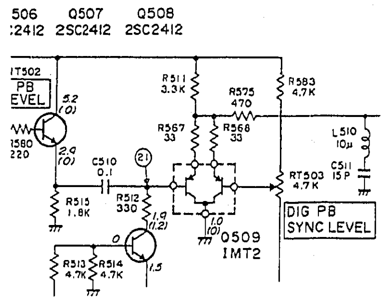
16. **ENC(COLOR ENCODER) Schematic/Circuit Board** (schematic on pages 5-49~5-51 and circuit board on pages 5-74~5-75 in Service Manual No. 3227E.)
(Only the changed sections are shown in the ENC(COLOR ENCODER) schematic.

After Change	Before Change

Units with Serial No. (XXX00151 and later) already changed.
Page 5-49 (E-4)
1. To improve the SYNC temperature compensation (changed simultaneously with item 14.1).

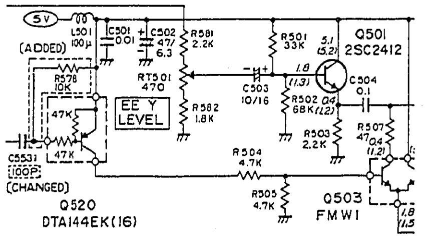


Q507 2SC2412
Q508 2SC2412
(ADDED)
TH206
R583 6.8K (CHANGED)
R511 3.3K
R575 470
R567 33
R568 33
R599 12K
L510 10μ
C511 15P
RT503 4.7K
RT502 PB LEVEL
R580 220
C510 0.1
R515 1.8K
R512 330
R513 4.7K
R514 4.7K
Q509 IMT2
DIG PB SYNC LEVEL

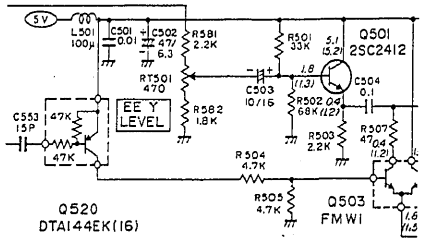


Q507 2SC2412
Q508 2SC2412
R511 3.3K
R575 470
R583 4.7K
R567 33
R568 33
L510 10μ
C511 15P
RT503 4.7K
RT502 PB LEVEL
R580 220
C510 0.1
R515 1.8K
R512 330
R513 4.7K
R514 4.7K
Q509 IMT2
DIG PB SYNC LEVEL

Units with Serial No. (XXX00251 and later) already changed.
Page 5-49 (D-4)
2. To prevent distortion and EE sag in the simultaneous monitor picture.

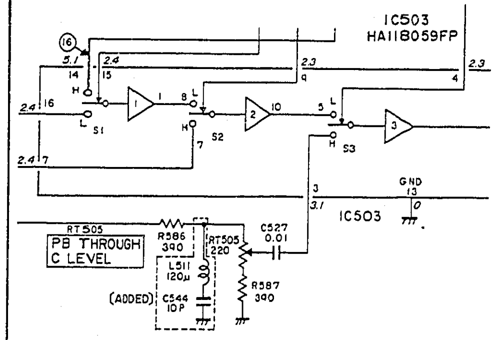


5V
L501 100μ
C501 0.01
C502 47/6.3
R581 2.2K
(ADDED)
R578 10K
RT501 470
EE Y LEVEL
R582 1.8K
R501 33K
Q501 2SC2412
C503 10/16
R502 68K
C504 0.1
R503 2.2K
R507 47
R504 4.7K
R505 4.7K
Q503 FMW1
C553 100P (CHANGED)
Q520 DTA144EK(16)

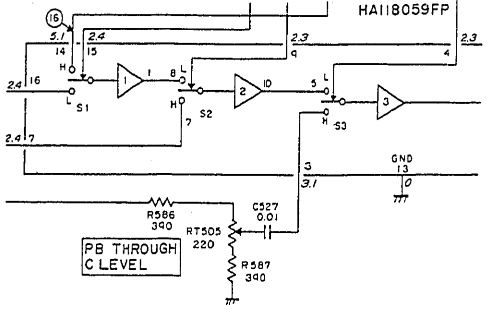


5V
L501 100μ
C501 0.01
C502 47/6.3
R581 2.2K
RT501 470
EE Y LEVEL
R582 1.8K
R501 33K
Q501 2SC2412
C503 10/16
R502 68K
C504 0.1
R503 2.2K
R507 47
R504 4.7K
R505 4.7K
Q503 FMW1
C553 15P
Q520 DTA144EK(16)

Units with Serial No. (XXX02051 and later) already changed.
Page 5-50 (A-4)
3. A trap is added to prevent color beats.



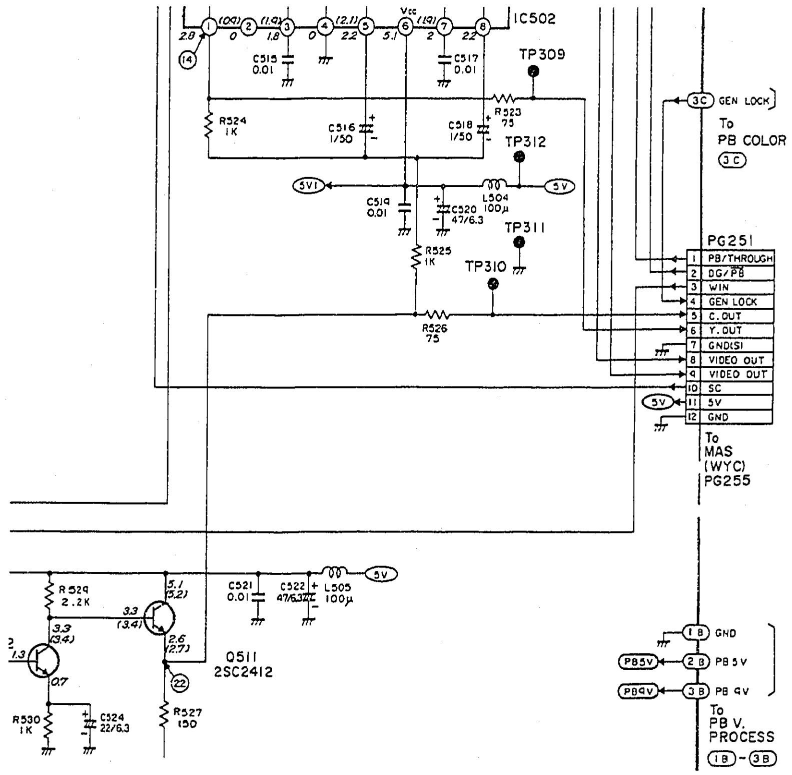
IC503 HA118059FP
S1
S2
S3
GND
IC503
RT505
PB THROUGH C LEVEL
R586 390
RT505 220
C527 0.01
R587 390
L511 120μ
(ADDED)
C544 10P



IC503 HA118059FP
S1
S2
S3
GND
R586 390
RT505 220
C527 0.01
PB THROUGH C LEVEL
R587 390

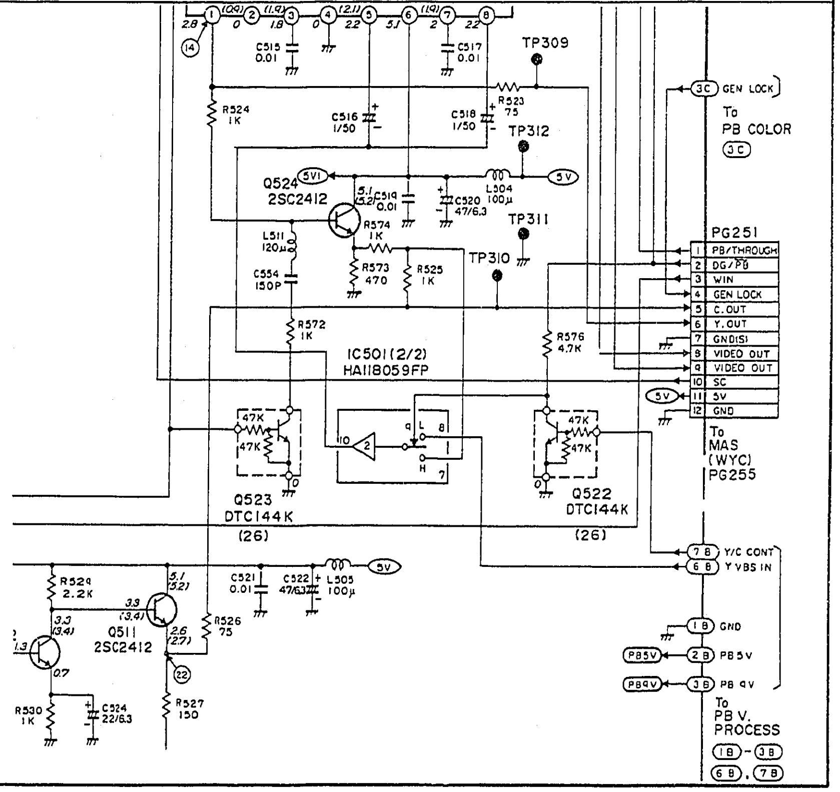
4. To correct the service material Page 5-50,51 (B,C-7,8)

After Correction

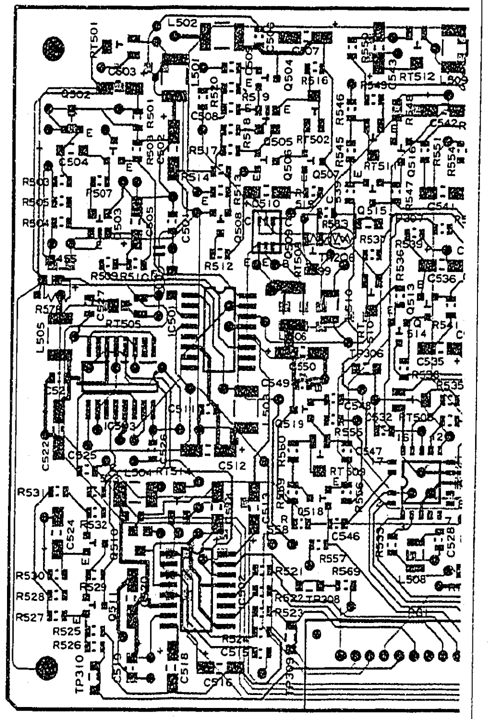
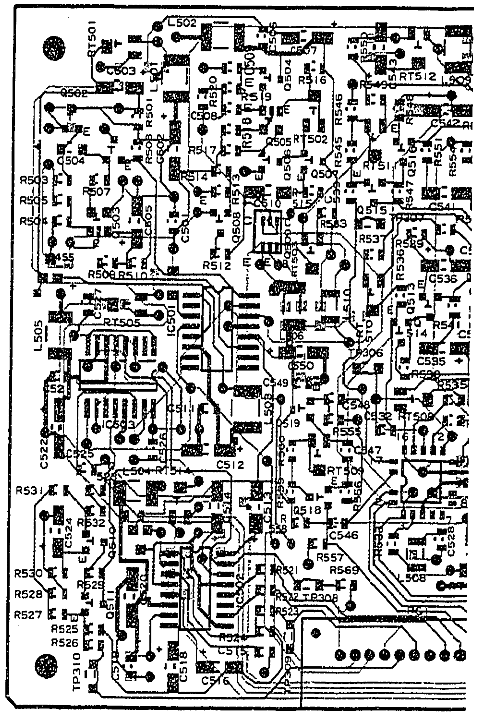


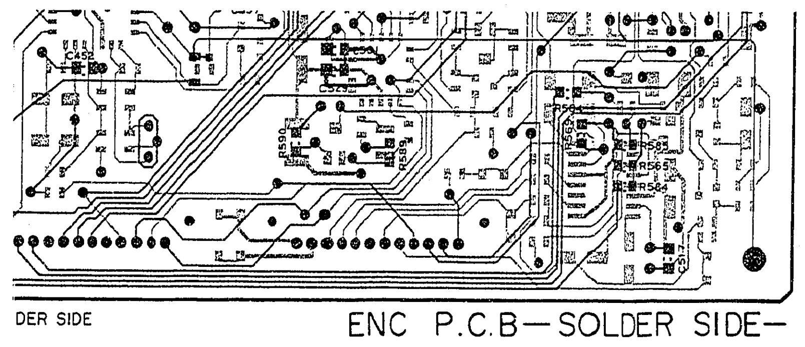
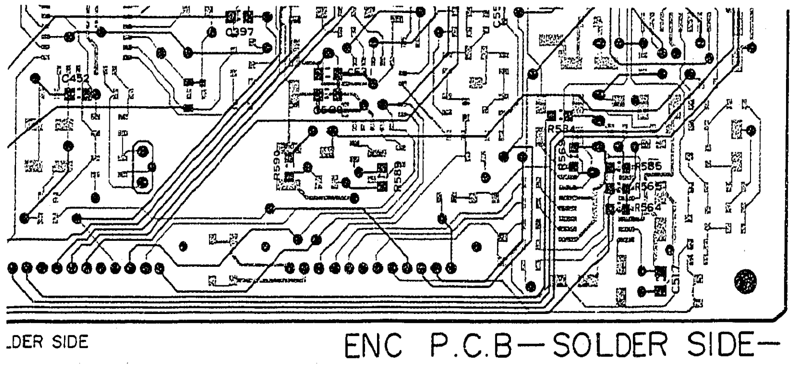
IC502
TP309
C515 0.01
C517 0.01
R524 1K
C516 1/50
C518 1/50
R523 75
TP312
GEN LOCK
To PB COLOR
5V1
5V
C519 0.01
C520 47/6.3
L504 100μ
TP311
R525 1K
TP310
R526 75
PG251
PB/THROUGH
DG/PB
WIN
GEN LOCK
C.OUT
Y.OUT
GND(S)
VIDEO OUT
VIDEO OUT
SC
5V
GND
To MAS (WYC) PG255
R529 2.2K
Q511 2SC2412
C521 0.01
C522 47/6.3
L505 100μ
R530 1K
C524 22/6.3
R527 150
GND
PB5V
PB 9V
To PB V. PROCESS

Before Correction



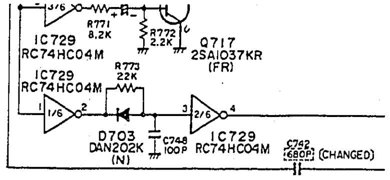
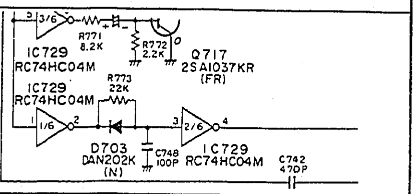
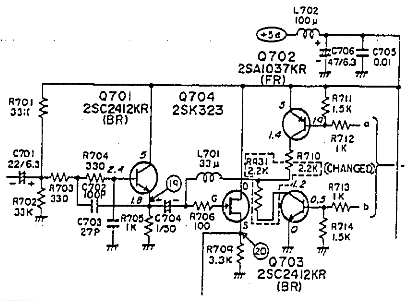
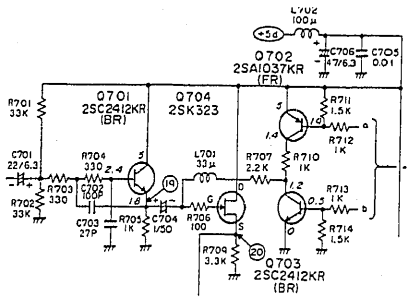
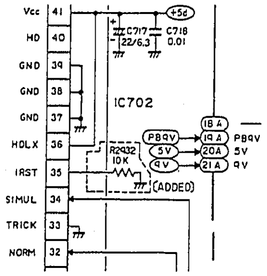
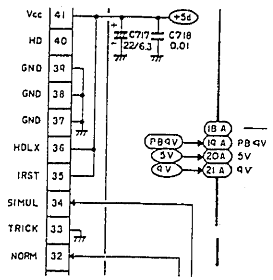
TP309
C515 0.01
C517 0.01
R524 1K
C516 1/50
C518 1/50
R523 75
TP312
GEN LOCK
To PB COLOR
Q524 2SC2412
5V1
5V
L304 100μ
C519 0.01
C520 47/6.3
R574 1K
TP311
L511 120μ
C554 150P
R573 470
R525 1K
TP310
R572 1K
IC501(2/2) HA118059FP
R576 4.7K
PG251
PB/THROUGH
DG/PB
WIN
GEN LOCK
C.OUT
Y.OUT
GND(S)
VIDEO OUT
VIDEO OUT
SC
5V
GND
To MAS (WYC) PG255
Q523 DTC144K (26)
Q522 DTC144K (26)
Y/C CONT
YVBS IN
R529 2.2K
Q511 2SC2412
R526 75
C521 0.01
C522 47/6.3
L505 100μ
R530 1K
C524 22/6.3
R527 150
GND
PB5V
PB 9V
To PB V. PROCESS

5. Changes to ENC board	Page 5-74 (E,D-1,2)
After Change	Before Change
	

6. Changes to ENC board	Pages 5-74,75(A-4,5,6)
After Change	
Before Change	

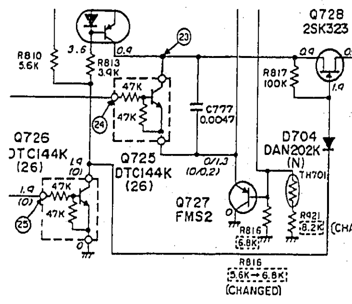
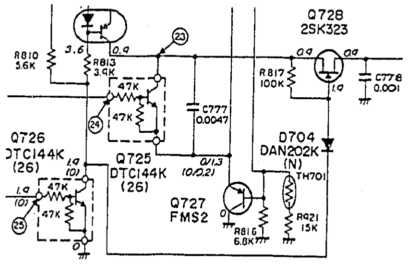
DER SIDE
ENC P.C.B—SOLDER SIDE—
.DER SIDE
ENC P.C.B—SOLDER SIDE—

17. DIG (1/3) Schematic/Circuit Board (schematic on pages 5-52~5-54 and circuit board on pages 5-76~5-77 in Service manual No. 3227E.)
(Only the changed sections are shown in the DIG(DIG 1/3) schematic. Refer to pages 1-39~1-40 for the entire DIG circuit board.)

After Change	Before Change
Units with Serial No. (XXX00151 and later) already changed. Page 5-52(A-2) 1. To prevent flickering across the top of the screen.	
	
Units with Serial No. (XXX02051 and later) already changed. Page 5-52(D,E-2) 2. To improve digital clamping.	
	
Units with Serial No. (XXX02251 and later) already changed. Page 5-54(C-11) 3. To prevent V DANCING when TBC is on.	
	

IC729 RC74HC04M
R771 8.2K
R772 2.2K
Q717 2SA1037KR (FR)
R773 22K
D703 DAN202K (N)
C748 100P
C742 680P (CHANGED)
C742 470P
Q701 2SC2412KR (BR)
Q702 2SA1037KR (FR)
Q703 2SC2412KR (BR)
Q704 2SK323
L701 33μ
L702 100μ
R701 33K
R702 33K
R703 330
R704 330
R706 100
R709 3.3K
R710 1K
R711 1.5K
R712 1K
R713 1K
R714 1.5K
R931 2.2K (CHANGED)
R707 2.2K
Vcc 41
HD 40
GND 39
GND 38
GND 37
HDLX 36
IRST 35
SIMUL 34
TRICK 33
NORM 32
IC702
PB4V
5V
4V
R2432 10K
(ADDED)

18. DIG (2/3) Schematic/Circuit Board (schematic on pages 5-55~5-57 and circuit board on pages 5-76~5-77 in Service Manual No. 3227E.)
(Only the changed sections are shown in the DIG (2/3) schematic. Refer to pages 1-39~1-40 for the entire DIG circuit board.)

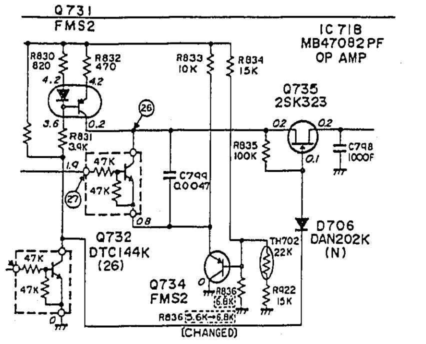
After Change	Before Change
Units with Serial No. (XXX00151 and later) already changed. Page 5-55 (E-3) 1. To improve the thermal characteristics.	
	

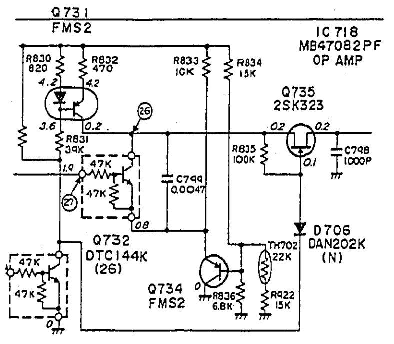
Q728 2SK323
R810 5.6K
R813 3.9K
R817 100K
C777 0.0047
C778 0.001
Q726 DTC144K (26)
Q725 DTC144K (26)
Q727 FMS2
D704 DAN202K (N)
TH701
R921 8.2K (CHANGED)
R921 15K
R816 5.6K→6.8K (CHANGED)
R816 6.8K

After Change | Before Change

Units with Serial No. (XXX00151 and later) already changed.
Page 5-55(C-3)

2. To improve the thermal characteristics.


Q731
FMS2
IC718
MB47082PF
OP AMP
R830 820
R832 470
R833 10K
R834 15K
Q735
2SK323
R831 39K
R835 100K
C799 0.0047
C798 1000P
D706
DAN202K
(N)
Q732
DTC144K
(26)
Q734
FMS2
TH702 22K
R922 15K
R836 5.6K→6.8K
(CHANGED)

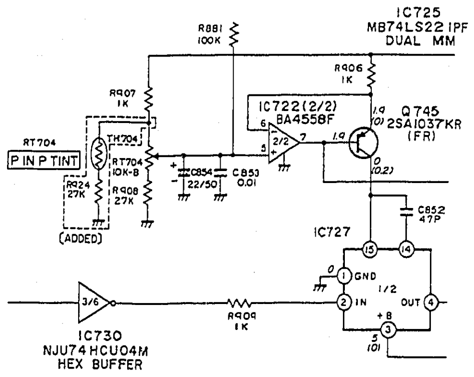

Q731
FMS2
IC718
MB47082PF
OP AMP
R830 820
R832 470
R833 10K
R834 15K
Q735
2SK323
R831 39K
R835 100K
C799 0.0047
C798 1000P
D706
DAN202K
(N)
Q732
DTC144K
(26)
Q734
FMS2
TH702 22K
R836 6.8K
R922 15K

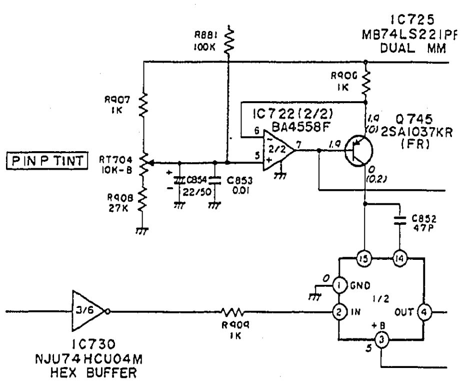
19. **DIG (3/3) Schematic/Circuit Board** (schematic on pages 5-58~5-59 and circuit board on pages 5-76~5-77 in Service Manual No. 3227E.)
(Only the changed sections are shown in the DIG (3/3) schematic. Refer to pages 1-39~1-40 for the entire DIG circuit board.)

After Change | Before Change

Units with Serial No. (XXX00151 and later) already changed.
Page 5-58 (B-2)

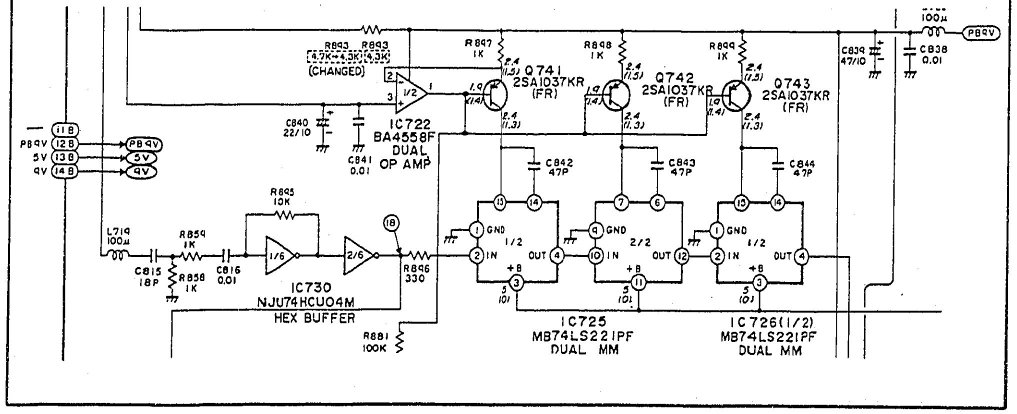
1. To improve the thermal characteristics and chroma phase of simultaneous monitoring picture.


IC725
MB74LS221PF
DUAL MM
R881 100K
R906 1K
R907 1K
IC722(2/2)
BA4558F
Q745
2SA1037KR
(FR)
RT704
P IN P TINT
TH704
RT704 10K-B
R924 27K
R908 27K
C854 22/50
C853 0.01
(ADDED)
C852 47P
IC727
GND
IN
OUT
+B
R909 1K
IC730
NJU74HCU04M
HEX BUFFER

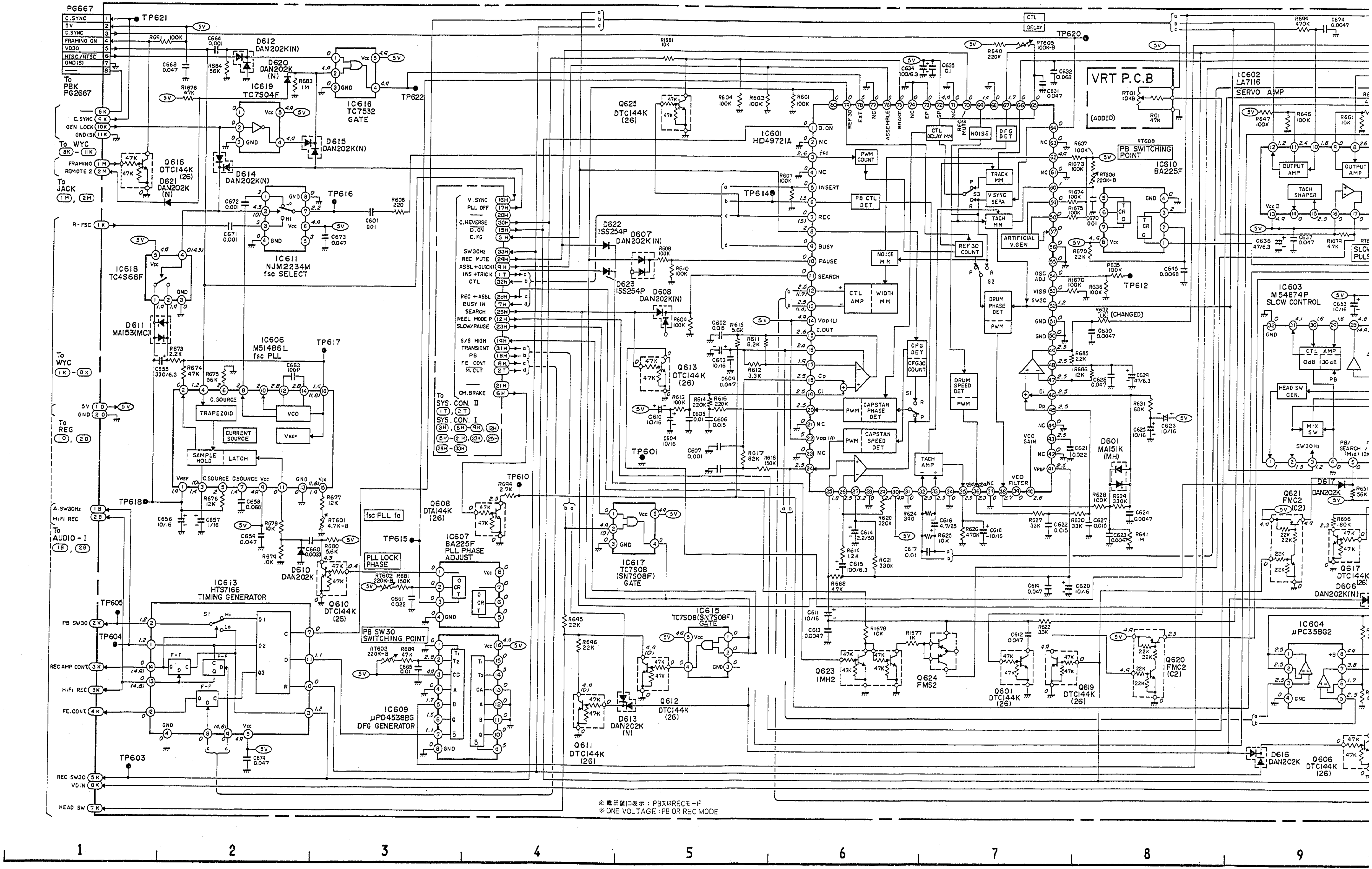

IC725
MB74LS221PF
DUAL MM
R881 100K
R906 1K
R907 1K
IC722(2/2)
BA4558F
Q745
2SA1037KR
(FR)
P IN P TINT
RT704 10K-B
R908 27K
C854 22/50
C853 0.01
C852 47P
GND
IN
OUT
+B
R909 1K
IC730
NJU74HCU04M
HEX BUFFER

Units with Serial No. (XXX00151 and later) already changed.
Page 5-58 (C-3)

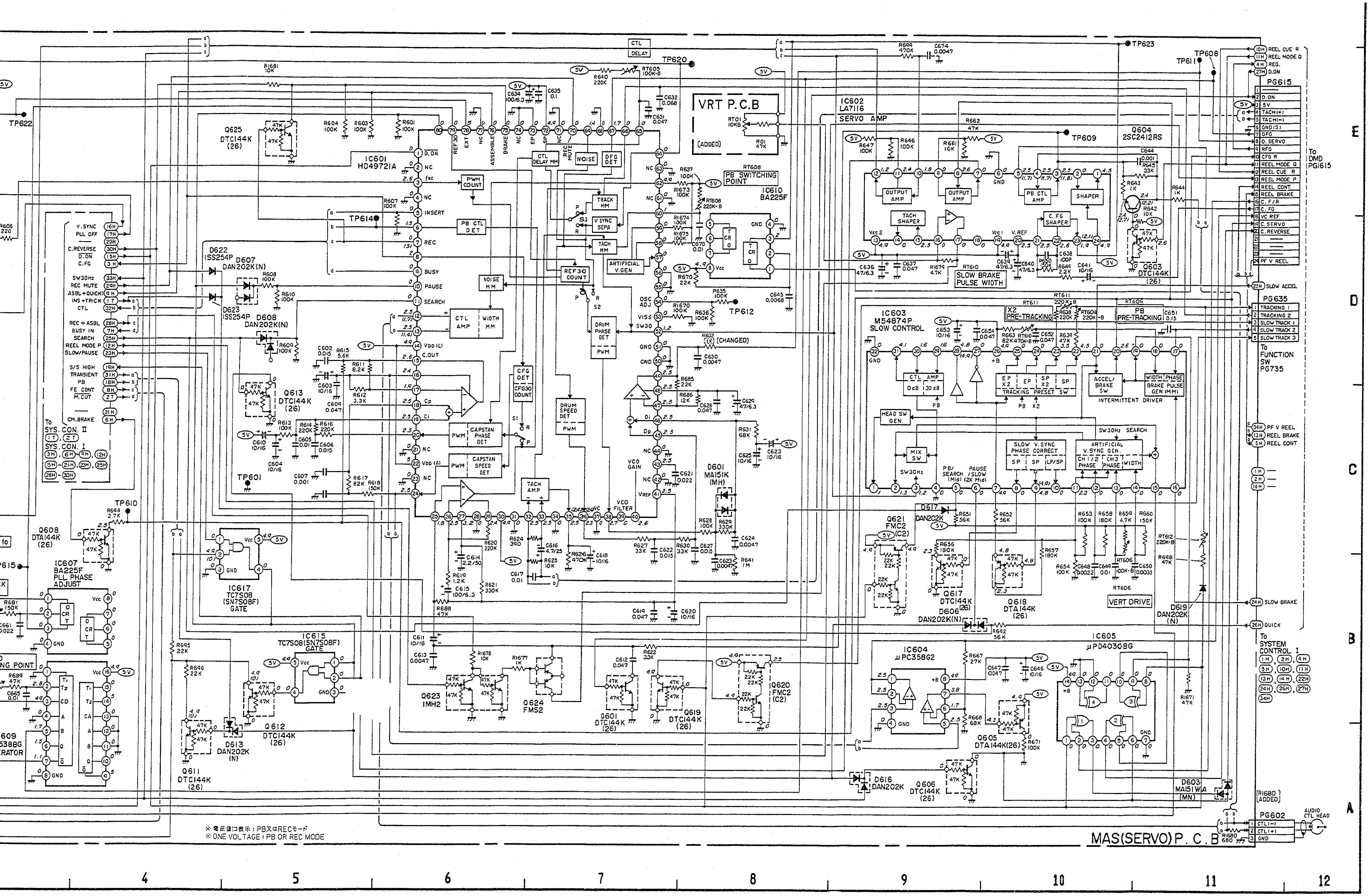
2. To improve the subcarrier phase and thermal chavacteristics.


R893 R893
4.7K→4.3K 4.3K
(CHANGED)
R847 1K
Q741
2SA1037KR
(FR)
R848 1K
Q742
2SA1037KR
(FR)
R849 1K
Q743
2SA1037KR
(FR)
100μ
PB9V
C839 47/10
C838 0.01
C840 22/10
C841 0.01
IC722
BA4558F
DUAL
OP AMP
C842 47P
C843 47P
C844 47P
PB9V 5V 9V
R895 10K
L719 100μ
R859 1K
C815 18P
R858 1K
C816 0.01
IC730
NJU74HCU04M
HEX BUFFER
R896 330
R881 100K
GND
IN
OUT
+B
IC725
MB74LS221PF
DUAL MM
IC726(1/2)
MB74LS221PF
DUAL MM

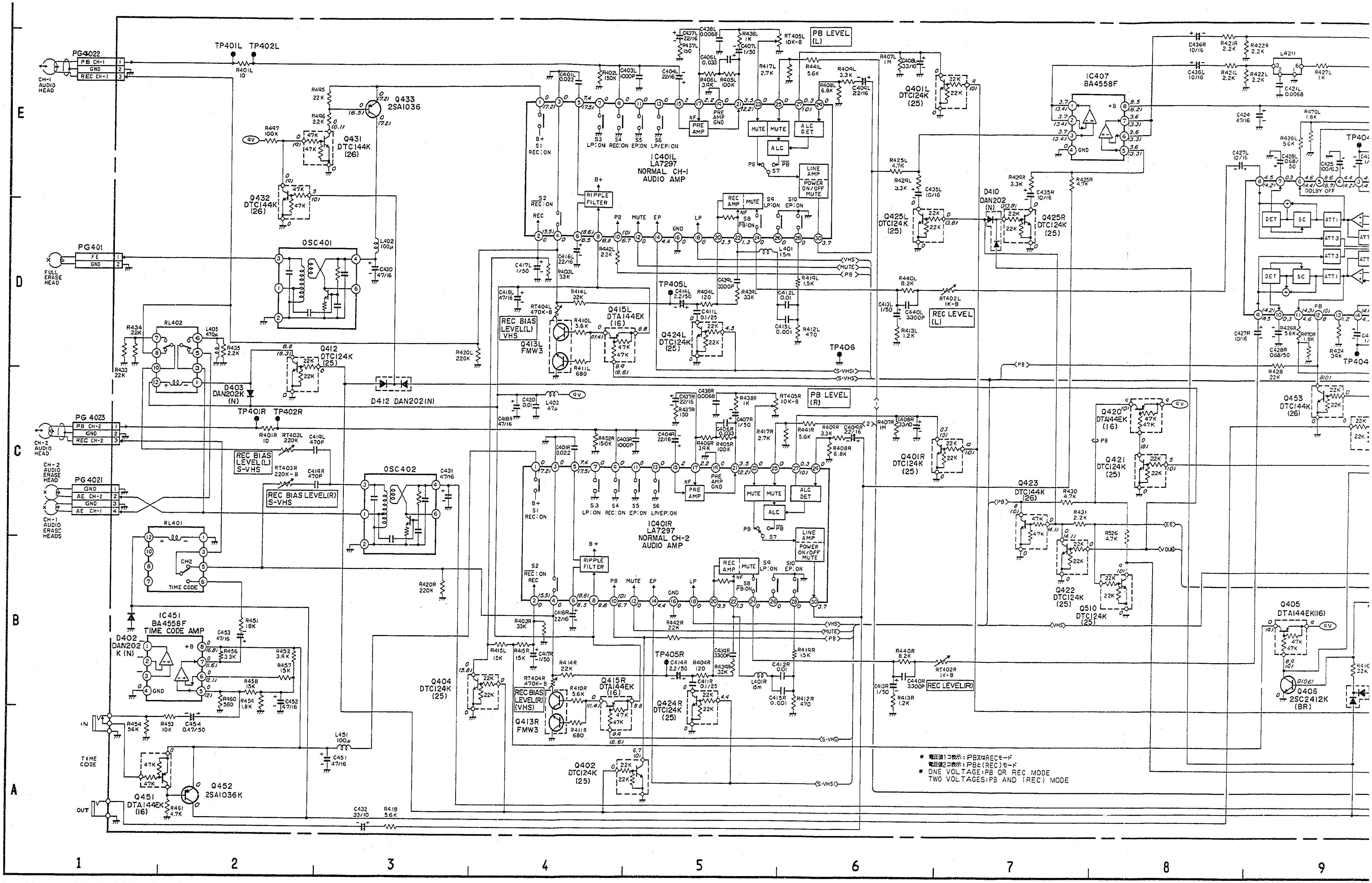
SERVO SCHEMATIC DIAGRAM


PG667
C.SYNC
5V
C.SYNC
FRAMING ON
VD30
NTSC/NTSC
GND(S)
To PBK PG2667
TP621
To WYC (8K)-(11K)
To JACK (1M), (2M)
To WYC (1K)-(8K)
To REG (1D), (2D)
To AUDIO-I (1B), (2B)
IC619 TC7S04F
IC616 TC7S32 GATE
D612 DAN202K(N)
D620 DAN202K(N)
D615 DAN202K(N)
D614 DAN202K(N)
Q616 DTC144K (26)
D621 DAN202K (N)
TP622
TP616
IC611 NJM2234M fsc SELECT
IC618 TC4S66F
D611 MA153(MC)
IC606 M51486L fsc PLL
TP617
TRAPEZOID
CURRENT SOURCE
VCO
VREF
SAMPLE HOLD
LATCH
TP618
TP610
Q608 DTA144K (26)
fsc PLL fo
TP615
PLL LOCK PHASE
IC607 BA225F PLL PHASE ADJUST
D610 DAN202K
Q610 DTC144K (26)
IC613 HT57166 TIMING GENERATOR
TP605
TP604
TP603
PB SW30
REC AMP CONT
HiFi REC
FE.CONT
REC SW30
VD IN
HEAD SW
PB SW30 SWITCHING POINT
IC609 μPD4538BG DFG GENERATOR
V.SYNC
PLL OFF
C.REVERSE
D.ON
C.FG
SW30Hz
REC MUTE
ASBL+QUICK
INS+TRICK
CTL
REC+ASBL
BUSY IN
SEARCH
REEL MODE P
SLOW/PAUSE
S/S HIGH
TRANSIENT
PB
FE CONT
M.CUT
CM.BRAKE
SYS.CON. II
SYS.CON. I
Q625 DTC144K (26)
IC601 HD49721A
D622 1SS254P
D607 DAN202K(N)
D623 1SS254P
D608 DAN202K(N)
Q613 DTC144K (26)
TP614
TP601
IC617 TC7S08 (SN7S08F) GATE
IC615 TC7S08(SN7S08F) GATE
Q612 DTC144K (26)
D613 DAN202K (N)
Q611 DTC144K (26)
Q623 IMH2
Q624 FMS2
Q601 DTC144K (26)
Q619 DTC144K (26)
Q620 FMC2 (C2)
PWM COUNT
PB CTL DET
NOISE MM
CTL AMP
WIDTH MM
CFG DET
CFG30 COUNT
CAPSTAN PHASE DET
CAPSTAN SPEED DET
TACH AMP
DRUM SPEED DET
DRUM PHASE DET
REF 30 COUNT
TRACK MM
V SYNC SEPA
TACH MM
ARTIFICIAL V.GEN
CTL DELAY MM
NOISE
DFG DET
CTL DELAY
TP620
VRT P.C.B
(ADDED)
RT605 100K-B
PB SWITCHING POINT
RT608
IC610 BA225F
TP612
D601 MA151K (MH)
IC602 LA7116 SERVO AMP
OUTPUT AMP
TACH SHAPER
IC603 M54874P SLOW CONTROL
CTL AMP
HEAD SW GEN.
MIX SW
Q621 FMC2 (C2)
D617 DAN202K
Q617 DTC144K (26)
D606 DAN202K(N)
IC604 μPC358G2
D616 DAN202K
Q606 DTC144K (26)
1
2
3
4
5
6
7
8
9

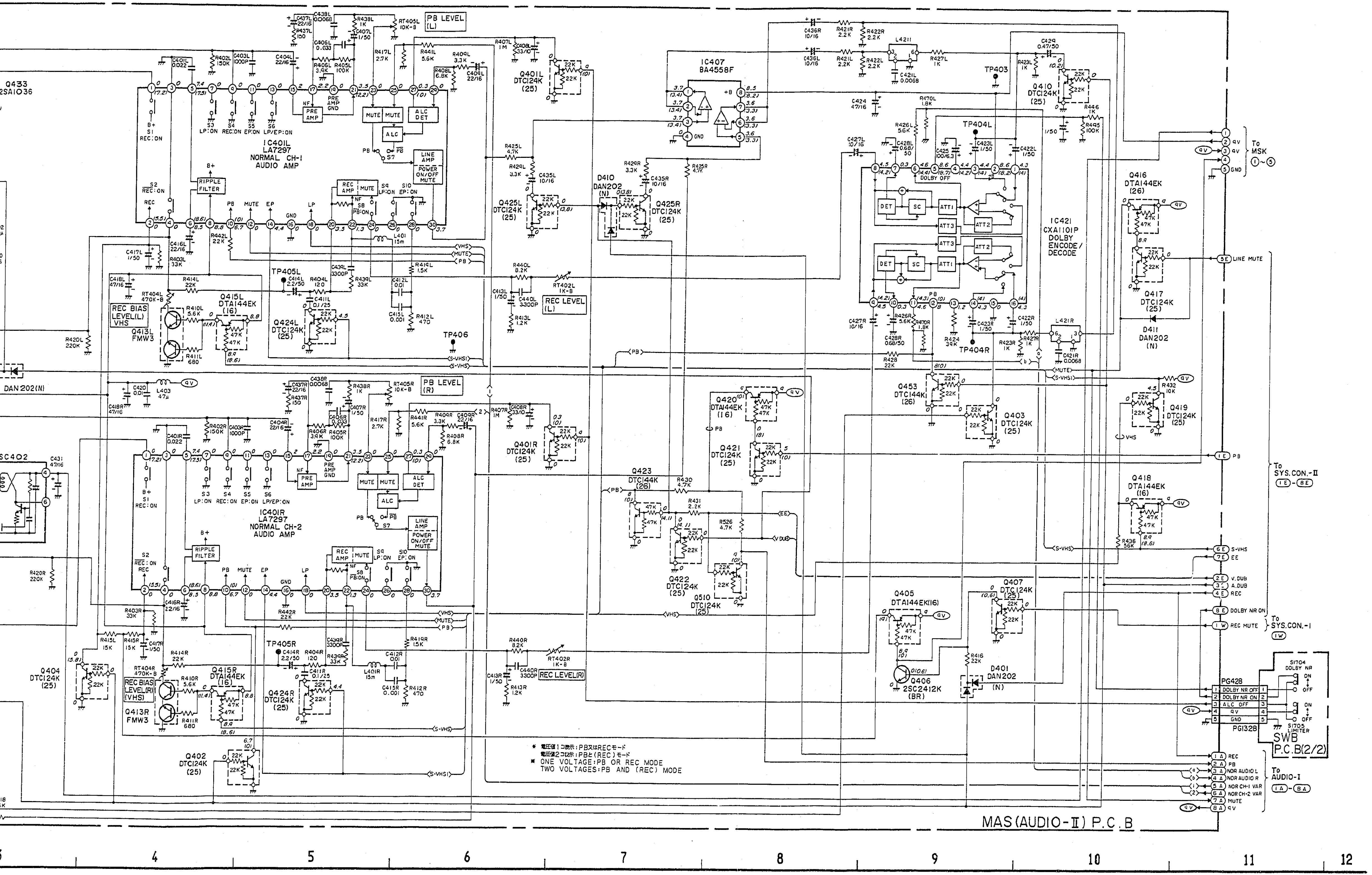
※ 電圧値に表示：PB又はRECモード
※ONE VOLTAGE : PB OR REC MODE


VRT P.C.B
RT01 10KB
R01 47K
(ADDED)
IC601
HD49721A
IC602
LA7116
SERVO AMP
IC603
M54874P
SLOW CONTROL
IC604
μPC358G2
IC605
μPD4030BG
IC607
BA225F
PLL PHASE ADJUST
IC609
IC610
BA225F
IC615
TC7S08(SN7S08F)
GATE
IC617
TC7S08
(SN7S08F)
GATE
Q604
2SC2412RS
Q603
DTC144K
(26)
Q605
DTA144K(26)
Q606
DTC144K
(26)
Q608
DTA144K
(26)
Q601
DTC144K
(26)
Q611
DTC144K
(26)
Q612
DTC144K
(26)
Q613
DTC144K
(26)
Q617
DTC144K
(26)
Q618
DTA144K
(26)
Q619
DTC144K
(26)
Q620
FMC2
(C2)
Q621
FMC2
(C2)
Q623
IMH2
Q624
FMS2
Q625
DTC144K
(26)
D601
MA151K
(MH)
D603
MA151WA
(MN)
D606
DAN202K(N)
D607
DAN202K(N)
D608
DAN202K(N)
D613
DAN202K
(N)
D616
DAN202K
D617
DAN202K
D619
DAN202K
(N)
D622
1SS254P
D623
1SS254P
TP601
TP609
TP610
TP611
TP612
TP614
TP620
TP622
TP623
TP608
RT608
PB SWITCHING POINT
CTL
DELAY
CTL DELAY MM
NOISE
DFG DET
PWM COUNT
TRACK MM
V SYNC SEPA
TACH MM
PB CTL DET
ARTIFICIAL V.GEN
REF30 COUNT
NOISE MM
CTL AMP
WIDTH MM
DRUM PHASE DET
PWM
CFG DET
CFG30 COUNT
DRUM SPEED DET
CAPSTAN PHASE DET
CAPSTAN SPEED DET
TACH AMP
VCO GAIN
VCO FILTER
OSC ADJ
R632 (CHANGED)
OUTPUT AMP
PB CTL AMP
SHAPER
TACH SHAPER
C. FG SHAPER
SLOW BRAKE PULSE WIDTH
X2 PRE-TRACKING
PB PRE-TRACKING
CTL AMP
0dB
30dB
EP X2
EP
SP X2
SP
TRACKING PRESET SW
ACCEL/ BRAKE SW
WIDTH PHASE
BRAKE PULSE GEN (MM)
INTERMITTENT DRIVER
HEAD SW GEN.
MIX SW
SW30Hz
SEARCH
SLOW V. SYNC PHASE CORRECT
ARTIFICIAL V. SYNC GEN.
CH 1/2 PHASE
CH3 PHASE
WIDTH
PB/ SEARCH (Mid)
PAUSE /SLOW (2X Mid)
VERT DRIVE
V. SYNC
PLL OFF
C.REVERSE
D.ON
C.FG
SW30Hz
REC MUTE
ASBL+QUICK
INS+TRICK
CTL
REC+ASBL
BUSY IN
SEARCH
REEL MODE P
SLOW/PAUSE
S/S HIGH
TRANSIENT
PB
FE CONT
M.CUT
CM.BRAKE
To SYS. CON. II
To SYS. CON. I
REEL CUE R
REEL MODE Q
REG.
D.ON
PG615
To DMD PG1615
D.ON
5V
TACH(+)
TACH(-)
GND(S)
DFG
D. SERVO
RFG
CFG R
REEL MODE Q
REEL CUE R
REEL MODE P
REEL CONT.
REEL BRAKE
C. F/R
C. FG
VC REF
C.SERVO
C.REVERSE
PF V REEL
SLOW ACCEL
PG635
TRACKING 1
TRACKING 2
SLOW TRACK 1
SLOW TRACK 2
SLOW TRACK 3
To FUNCTION SW PG735
PF V REEL
REEL BRAKE
REEL CONT
SLOW BRAKE
QUICK
To SYSTEM CONTROL I
(R1680 ADDED)
PG602
CTL(-)
CTL(+)
GND
AUDIO CTL HEAD
MAS(SERVO) P. C. B
※ 電圧値は表示：PB又はRECモード
※ ONE VOLTAGE : PB OR REC MODE
4
5
6
7
8
9
10
11
12
E
D
C
B
A

AUDIO SCHEMATIC DIAGRAM

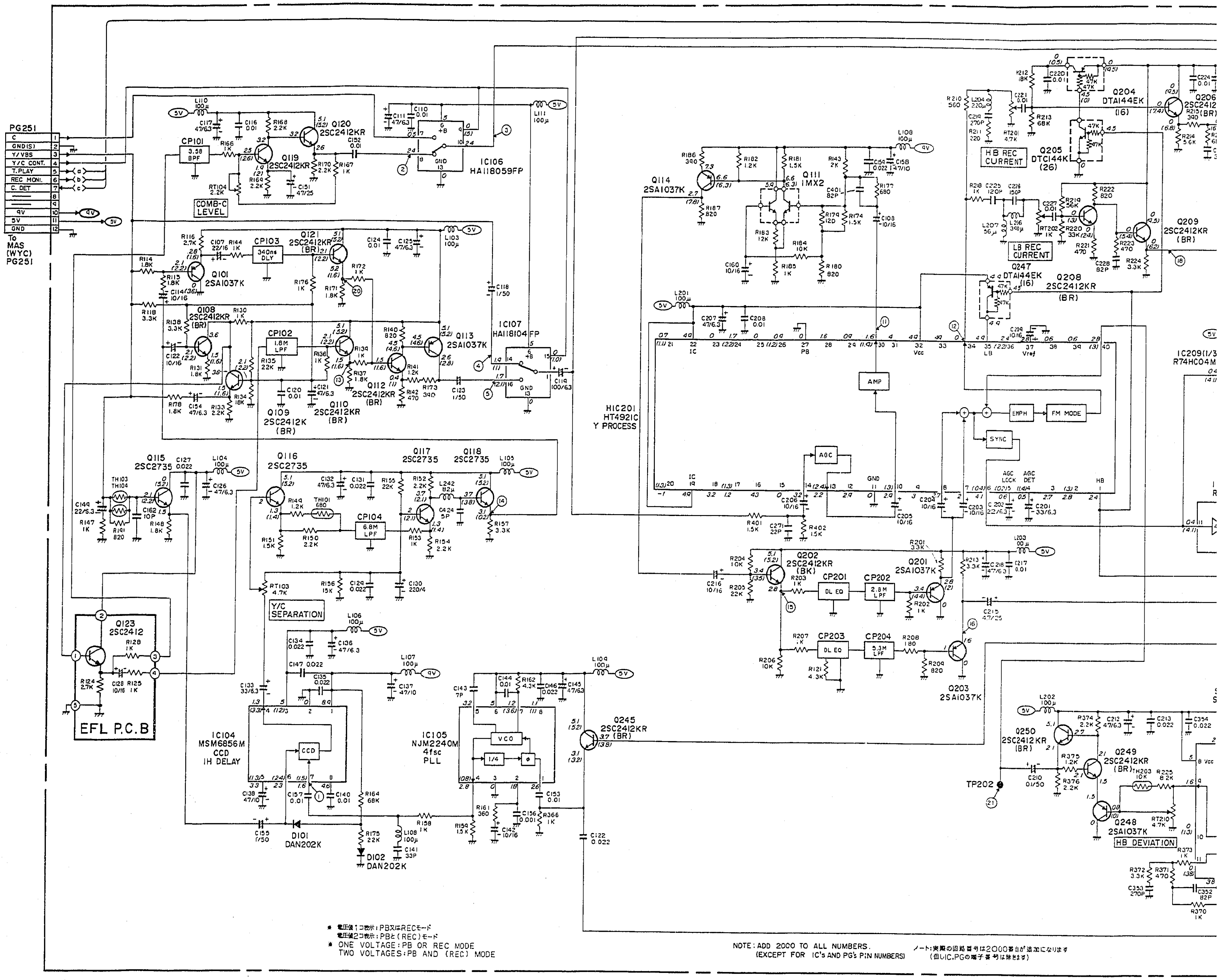

CH-1 AUDIO HEAD
PG4022
PB CH-1
GND
REC CH-1
TP401L TP402L
R401L 10
FULL ERASE HEAD
PG401
FE
GND
OSC401
L402 100μ
C430 47/16
RL402
L405 470μ
R434 22K
R433 22K
R435 2.2K
D403 DAN202K (N)
Q412 DTC124K (25)
D412 DAN202(N)
CH-2 AUDIO HEAD
PG 4023
PB CH-2
GND
REC CH-2
TP401R TP402R
R401R 10
RT403L 220K
C419L 470P
REC BIAS LEVEL(L) S-VHS
RT403R 220K-B
C419R 470P
REC BIAS LEVEL(R) S-VHS
CH-2 AUDIO ERASE HEAD
CH-1 AUDIO ERASE HEADS
PG4021
GND
AE CH-2
GND
AE CH-1
OSC402
C431 47/16
RL401
CH2
TIME CODE
IC451 BA4558F TIME CODE AMP
D402 DAN202 K (N)
R451 18K
C453 47/16
R456 3.3K
R452 3.9K
R457 15K
R458 15K
R460 560
R459 1.8K
C452 47/16
IN
R454 56K
R453 10K
C454 0.47/50
TIME CODE
L451 100μ
C451 47/16
Q451 DTA144EK (16)
Q452 2SA1036K
R461 4.7K
OUT
C432 33/10
R418 5.6K
Q433 2SA1036
R495 22K
R496 22K
R497 100K
Q431 DTC144K (26)
Q432 DTC144K (26)
IC401L LA7297 NORMAL CH-1 AUDIO AMP
PRE AMP
NF
PRE AMP GND
MUTE
ALC
ALC DET
LINE AMP
POWER ON/OFF MUTE
RIPPLE FILTER
REC AMP
S1 REC:ON
S2 REC:ON
S3 LP:ON
S4 REC:ON
S5 EP:ON
S6 LP/EP:ON
S7
S8 PB:ON
S9 LP:ON
S10 EP:ON
PB LEVEL (L)
RT405L 10K-B
R420L 220K
R403L 33K
R442L 22K
C416L 22/16
C417L 1/50
C418L 47/16
RT404L 470K-B
REC BIAS LEVEL(L) VHS
Q413L FMW3
R410L 3.6K
R411L 680
Q415L DTA144EK (16)
R414L 22K
TP405L
C414L 2.2/50
R404L 120
C411L 0.1/25
Q424L DTC124K (25)
C434L 3300P
R434L 33K
L401 15m
C412L 0.01
C415L 0.001
R412L 470
R419L 1.5K
TP406
Q401L DTC124K (25)
R407L 1M
C408L 33/10
R425L 4.7K
R429L 3.3K
C435L 10/16
Q425L DTC124K (25)
R440L 8.2K
RT402L 1K-B
REC LEVEL (L)
C413L 1/50
C440L 3300P
R413L 1.2K
C420 0.01
L403 47μ
IC401R LA7297 NORMAL CH-2 AUDIO AMP
PB LEVEL (R)
RT405R 10K-B
R420R 220K
R403R 33K
Q404 DTC124K (25)
RT404R 470K-B
REC BIAS LEVEL(R) (VHS)
Q413R FMW3
Q415R DTA144EK (16)
TP405R
Q424R DTC124K (25)
Q402 DTC124K (25)
Q401R DTC124K (25)
R440R 8.2K
RT402R 1K-B
REC LEVEL(R)
IC407 BA4558F
D410 DAN202 (N)
R429R 3.3K
C435R 10/16
R425R 4.7K
Q425R DTC124K (25)
Q420 DTA144EK (16)
Q421 DTC124K (25)
Q423 DTC144K (26)
R430 4.7K
R431 2.2K
R526 4.7K
Q422 DTC124K (25)
Q510 DTC124K (25)
Q453 DTC144K (26)
Q405 DTA144EK(16)
Q406 2SC2412K (BR)
L421
C421L 0.0068
R427L 1K
DET
SC
ATT1
ATT3
DOLBY OFF
TP404
VHS
MUTE
PB
S-VHS
EE
VDUB
QV
1
2
3
4
5
6
7
8
9
E
D
C
B
A

- 電圧値1コ表示：PB又はRECモード
  電圧値2コ表示：PBと(REC)モード
- ONE VOLTAGE:PB OR REC MODE
  TWO VOLTAGES:PB AND (REC) MODE


IC401L LA7297 NORMAL CH-1 AUDIO AMP
IC401R LA7297 NORMAL CH-2 AUDIO AMP
IC407 BA4558F
IC421 CXA1101P DOLBY ENCODE/DECODE
PB LEVEL (L)
PB LEVEL (R)
REC LEVEL (L)
REC LEVEL(R)
REC BIAS LEVEL(L) VHS
REC BIAS LEVEL(R) (VHS)
RIPPLE FILTER
PRE AMP
MUTE
ALC
ALC DET
LINE AMP
POWER ON/OFF MUTE
REC AMP
DET
SC
ATT1
ATT2
ATT3
DOLBY OFF
TP403
TP404L
TP404R
TP405L
TP405R
TP406
Q401L DTC124K (25)
Q401R DTC124K (25)
Q402 DTC124K (25)
Q403 DTC124K (25)
Q404 DTC124K (25)
Q405 DTA144EK(16)
Q406 2SC2412K (BR)
Q407 DTC124K (25)
Q410 DTC124K (25)
Q413L FMW3
Q413R FMW3
Q415L DTA144EK (16)
Q415R DTA144EK (16)
Q416 DTA144EK (26)
Q417 DTC124K (25)
Q418 DTA144EK (16)
Q419 DTC124K (25)
Q420 DTA144EK (16)
Q421 DTC124K (25)
Q422 DTC124K (25)
Q423 DTC144K (26)
Q424L DTC124K (25)
Q424R DTC124K (25)
Q425L DTC124K (25)
Q425R DTC124K (25)
Q433 2SA1036
Q453 DTC144K (26)
Q510 DTC124K (25)
D401 DAN202 (N)
D410 DAN202 (N)
D411 DAN202 (N)
DAN202(N)
SC402
S1 REC:ON
S2 REC:ON
S3 LP:ON
S4 REC:ON
S5 EP:ON
S6 LP/EP:ON
S7
S8 PB:ON
S9 LP:ON
S10 EP:ON
L401 15m
L403 47μ
L421L
L421R
To MSK ①~⑤
LINE MUTE
To SYS.CON.-II (1E)-(8E)
S-VHS
EE
V.DUB
A.DUB
REC
DOLBY NR ON
REC MUTE
To SYS.CON.-I (1W)
PG428
DOLBY NR OFF
DOLBY NR ON
ALC OFF
9V
GND
PG1328
S1704 DOLBY NR
S1705 LIMITER
SWB P.C.B(2/2)
REC
PB
NOR AUDIO L
NOR AUDIO R
NOR CH-1 VAR
NOR CH-2 VAR
MUTE
9V
To AUDIO-I (1A)-(8A)
MAS(AUDIO-II) P.C.B
4
5
6
7
8
9
10
11
12

※ 電圧値1コ表示：PB又はRECモード
電圧値2コ表示：PBと（REC）モード
※ ONE VOLTAGE:PB OR REC MODE
TWO VOLTAGES:PB AND (REC) MODE

VID 1/2 SCHEMATIC DIAGRAM

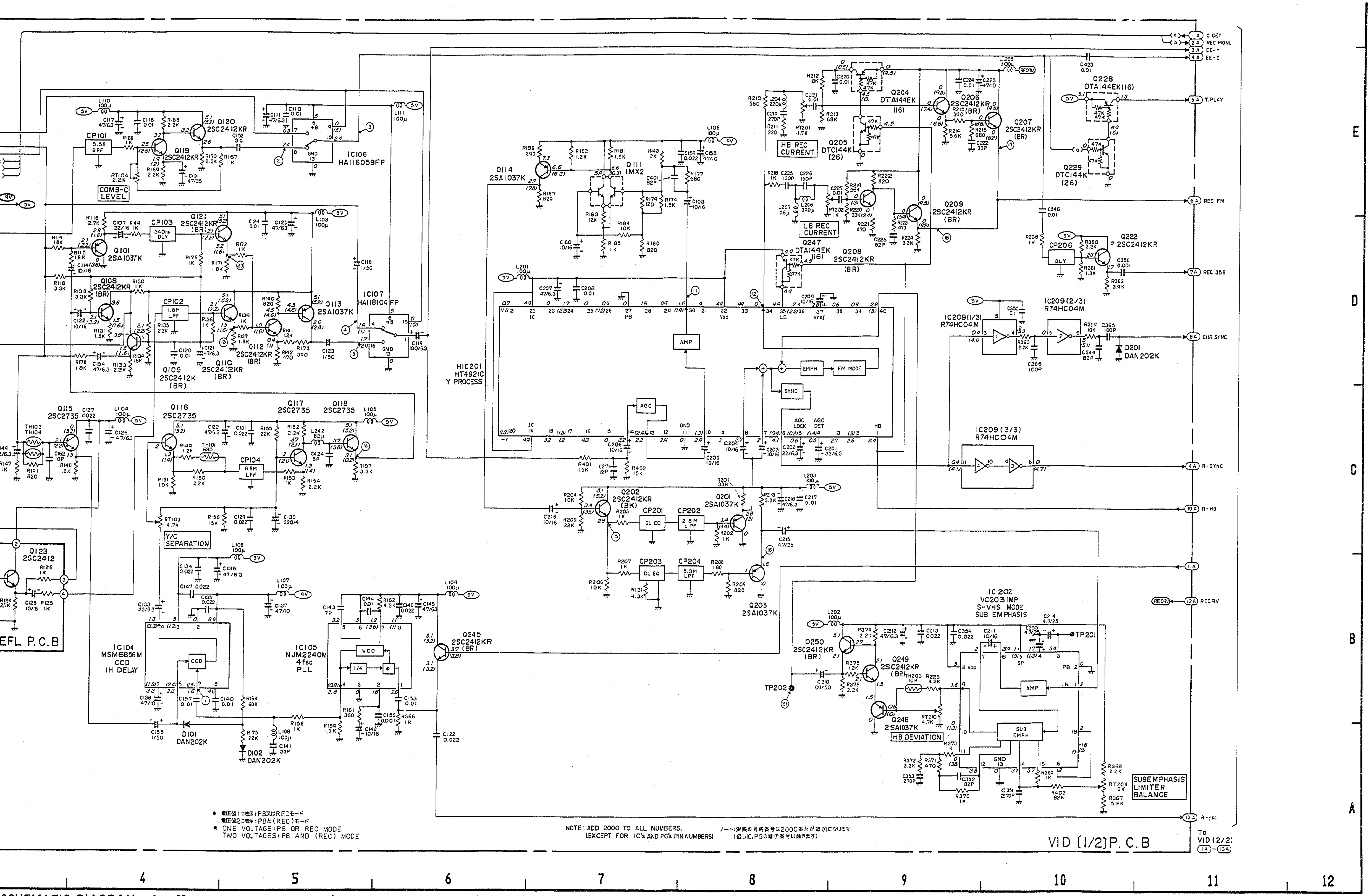

PG251
C
GND(S)
Y/VBS
Y/C CONT.
T.PLAY
REC MONI.
C. DET
9V
5V
GND
To MAS (WYC) PG251
CP101 3.58 BPF
COMB-C LEVEL
Q119 2SC2412KR
Q120 2SC2412KR
IC106 HA118059FP
Q101 2SA1037K
CP103 340ns DLY
Q121 2SC2412KR (BR)
Q108 2SC2412KR
CP102 1.8M LPF
Q109 2SC2412K (BR)
Q110 2SC2412KR (BR)
Q112 2SC2412KR (BR)
Q113 2SA1037K
IC107 HA118104FP
Q115 2SC2735
Q116 2SC2735
Q117 2SC2735
Q118 2SC2735
CP104 6.8M LPF
Y/C SEPARATION
Q123 2SC2412
EFL P.C.B
IC104 MSM6856M CCD 1H DELAY
CCD
IC105 NJM2240M 4fsc PLL
VCO
1/4
D101 DAN202K
D102 DAN202K
Q245 2SC2412KR (BR)
Q114 2SA1037K
Q111 IMX2
HIC201 HT4921C Y PROCESS
AMP
AGC
EMPH
FM MODE
SYNC
Q202 2SC2412KR (BK)
CP201 DL EQ
CP202 2.8M LPF
Q201 2SA1037K
CP203 DL EQ
CP204 3.3M LPF
Q203 2SA1037K
H.B REC CURRENT
Q204 DTA144EK
Q205 DTC144K
Q206 2SC2412 (BR)
L.B REC CURRENT
Q247 DTA144EK
Q208 2SC2412KR (BR)
Q209 2SC2412KR (BR)
IC209(1/3) R74HC04M
Q250 2SC2412KR (BR)
Q249 2SC2412KR (BR)
Q248 2SA1037K
H.B DEVIATION
TP202
1 2 3 4 5 6 7 8 9

* 電圧値1コ表示：PB又はRECモード
電圧値2コ表示：PBと（REC）モード

* ONE VOLTAGE: PB OR REC MODE
TWO VOLTAGES: PB AND (REC) MODE

NOTE: ADD 2000 TO ALL NUMBERS.
(EXCEPT FOR IC's AND PG's PIN NUMBERS)

ノート：実際の回路番号は2000番台が追加になります
（但しIC, PGの端子番号は除きます）



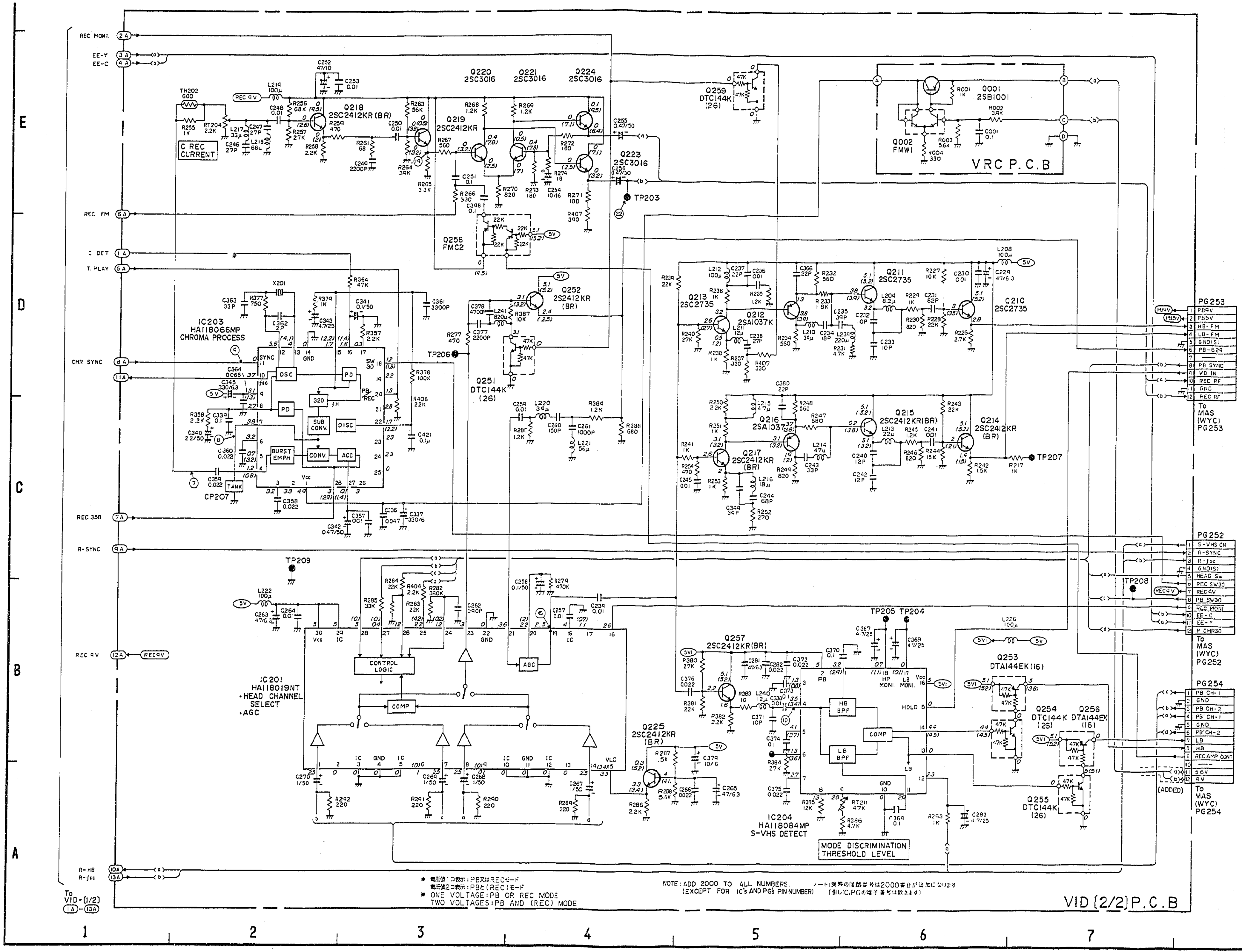
COMB-C LEVEL
CP101 3.58 BPF
Q119 2SC2412KR
Q120 2SC2412KR
IC106 HA118059FP
CP103 340ns DLY
Q101 2SA1037K
Q121 2SC2412KR (BR)
Q108 2SC2412KR (BR)
CP102 1.8M LPF
Q109 2SC2412K (BR)
Q110 2SC2412KR (BR)
Q112 2SC2412KR (BR)
Q113 2SA1037K
IC107 HA118104FP
Q115 2SC2735
Q116 2SC2735
Q117 2SC2735
Q118 2SC2735
CP104 6.8M LPF
Y/C SEPARATION
Q123 2SC2412
EFL P.C.B
IC104 MSM6856M CCD 1H DELAY
CCD
D101 DAN202K
D102 DAN202K
IC105 NJM2240M 4fsc PLL
VCO
1/4
Q245 2SC2412KR (BR)
Q114 2SA1037K
Q111 IMX2
HIC201 HT4921C Y PROCESS
AMP
AGC
EMPH
FM MODE
SYNC
Q202 2SC2412KR (BK)
Q201 2SA1037K
CP201 DL EQ
CP202 2.8M LPF
CP203 DL EQ
CP204 5.3M LPF
Q203 2SA1037K
HB REC CURRENT
LB REC CURRENT
Q204 DTA144EK (16)
Q205 DTC144K (26)
Q206 2SC2412KR
Q207 2SC2412KR (BR)
Q208 2SC2412KR (BR)
Q209 2SC2412KR (BR)
Q247 DTA144EK (16)
Q228 DTA144EK(16)
Q229 DTC144K (26)
Q222 2SC2412KR
CP206 DLY
IC209(1/3) R74HC04M
IC209(2/3) R74HC04M
IC209(3/3) R74HC04M
D201 DAN202K
IC202 VC2031MP S-VHS MODE SUB EMPHASIS
SUB EMPH
Q250 2SC2412KR (BR)
Q249 2SC2412KR (BR)
Q248 2SA1037K
HB DEVIATION
SUBEMPHASIS LIMITER BALANCE
TP201
TP202
1A C DET
2A REC MONI.
3A EE-Y
4A EE-C
5A T.PLAY
6A REC FM
7A REC 358
8A CHR SYNC
9A R-SYNC
10A R-HB
11A
12A REC9V
13A R-fsc
To VID (2/2) 1A-13A
VID (1/2) P.C.B
4
5
6
7
8
9
10
11
12
E
D
C
B
A

● 電圧値1コ表示：PB又はRECモード
電圧値2コ表示：PBと(REC)モード
✱ ONE VOLTAGE: PB OR REC MODE
TWO VOLTAGES: PB AND (REC) MODE

NOTE: ADD 2000 TO ALL NUMBERS.
(EXCEPT FOR IC's AND PG's PIN NUMBERS)

ノート:実際の回路番号は2000番台が追加になります
(但しIC,PGの端子番号は除きます)

VID 2/2 SCHEMATIC DIAGRAM

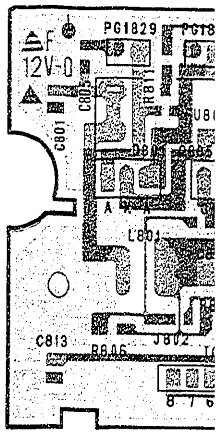

REC MONI. 2A
EE-Y 3A
EE-C 4A
REC FM 6A
C DET 1A
T. PLAY 5A
CHR SYNC 8A
11A
REC 358 7A
R-SYNC 9A
REC 9V 12A
R-HB 10A
R-fsc 13A
To VID-(1/2) 1A-13A
TH202 600
C REC CURRENT
Q218 2SC2412KR(BR)
Q219 2SC2412KR
Q220 2SC3016
Q221 2SC3016
Q224 2SC3016
Q223 2SC3016
Q258 FMC2
TP203
Q259 DTC144K (26)
Q001 2SB1001
Q002 FMW1
VRC P.C.B
IC203 HA118066MP CHROMA PROCESS
X201
OSC
PD
320
SUB CONV
DISC
BURST EMPH
CONV.
ACC
TANK
CP207
Q252 2SA1412KR (BR)
Q251 DTC144K (26)
TP206
Q213 2SC2735
Q212 2SA1037K
Q211 2SC2735
Q210 2SC2735
Q216 2SA1037
Q217 2SC2412KR (BR)
Q215 2SC2412KR(BR)
Q214 2SC2412KR (BR)
TP207
PG253
1 PB9V
2 PB5V
3 HB-FM
4 LB-FM
5 GND(S)
6 PB-629
7 —
8 PB SYNC
9 VD IN
10 REC RF
11 GND
12 REC RF
To MAS (WYC) PG253
TP209
IC201 HA118019NT
·HEAD CHANNEL SELECT
·AGC
CONTROL LOGIC
COMP
AGC
Q225 2SC2412KR (BR)
Q257 2SC2412KR(BR)
TP205 TP204
IC204 HA118084MP S-VHS DETECT
HB BPF
LB BPF
COMP
MODE DISCRIMINATION THRESHOLD LEVEL
Q253 DTA144EK(16)
Q254 DTC144K (26)
Q256 DTA144EK (16)
Q255 DTC144K (26)
TP208
PG252
1 S-VHS CH
2 R-SYNC
3 R-fsc
4 GND(S)
5 HEAD SW
6 REC SW30
7 REC9V
8 PB SW30
9 REC MONI
10 EE-C
11 EE-Y
12 P CHR30
To MAS (WYC) PG252
PG254
1 PB CH-1
2 GND
3 PB CH-2
4 PB' CH-1
5 GND
6 PB' CH-2
7 LB
8 HB
9 REC AMP CONT
10 —
11 5.6V
12 9V
(ADDED)
To MAS (WYC) PG254
VID (2/2) P.C.B
E
D
C
B
A
1
2
3
4
5
6
7
8

- 電圧値1コ表示：PB又はRECモード
  電圧値2コ表示：PBと(REC)モード
- ONE VOLTAGE: PB OR REC MODE
  TWO VOLTAGES: PB AND (REC) MODE

NOTE: ADD 2000 TO ALL NUMBERS.
(EXCEPT FOR IC's AND PG's PIN NUMBER)

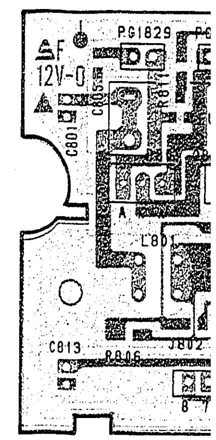
ノート：実際の回路番号は2000番台が追加になります
(但しIC,PGの端子番号は除きます)

REG CIRCUI
(No.1540

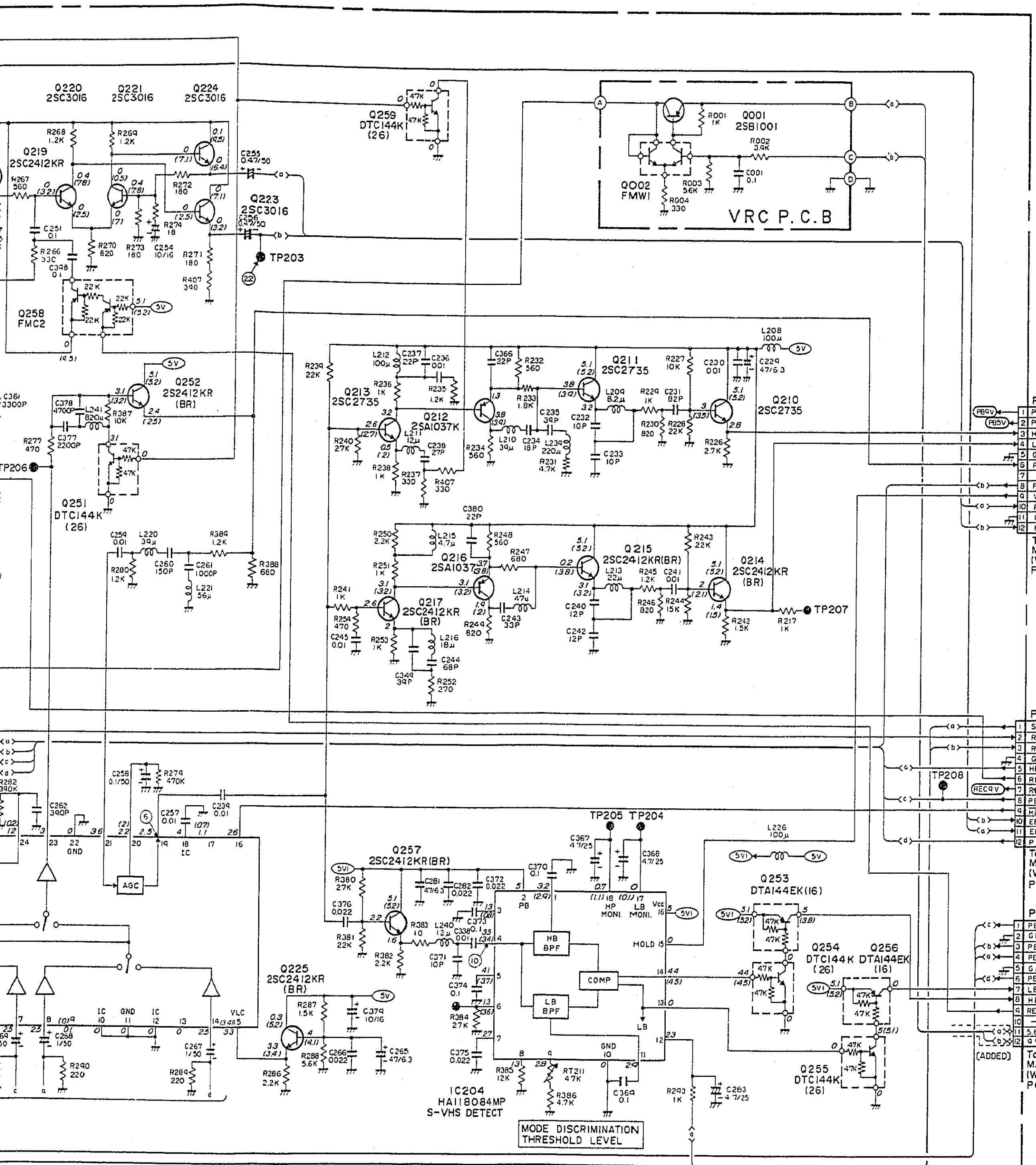

PG1829
12V-0
C801
C813
J802

COMPONENTS SIDE

REG CIRCUI
(No.1540


PG1829
12V-0
C801
C813
J802

COMPONENTS SIDE


Q220 2SC3016
Q221 2SC3016
Q224 2SC3016
Q219 2SC2412KR
Q223 2SC3016
Q258 FMC2
Q259 DTC144K (26)
Q001 2SB1001
Q002 FMW1
VRC P.C.B
TP203
Q252 2S2412KR (BR)
Q251 DTC144K (26)
TP206
Q213 2SC2735
Q212 2SA1037K
Q211 2SC2735
Q210 2SC2735
Q216 2SA1037
Q215 2SC2412KR(BR)
Q214 2SC2412KR (BR)
Q217 2SC2412KR (BR)
TP207
PG253
PB9V
PB5V
HB-FM
LB-FM
GND(S)
PB-629
PB SYNC
VD IN
REC RF
GND
REC RF
To MAS (WYC) PG253
PG252
S-VHS CN
R-SYNC
R-fsc
GND(S)
HEAD SW
REC SW30
REC9V
PB SW30
REC MONI
EE-C
EE-Y
P CHR30
To MAS (WYC) PG252
TP208
AGC
TP205 TP204
Q257 2SC2412KR(BR)
Q225 2SC2412KR (BR)
HB BPF
LB BPF
COMP
HP MONI.
LB MONI.
HOLD
IC204 HA118084MP S-VHS DETECT
MODE DISCRIMINATION THRESHOLD LEVEL
Q253 DTA144EK(16)
Q254 DTC144K (26)
Q256 DTA144EK (16)
Q255 DTC144K (26)
PG254
PB CH-1
GND
PB CH-2
PB' CH-1
GND
PB' CH-2
LB
HB
REC AMP CONT
5.6V
4V
(ADDED)
To MAS (WYC) PG254

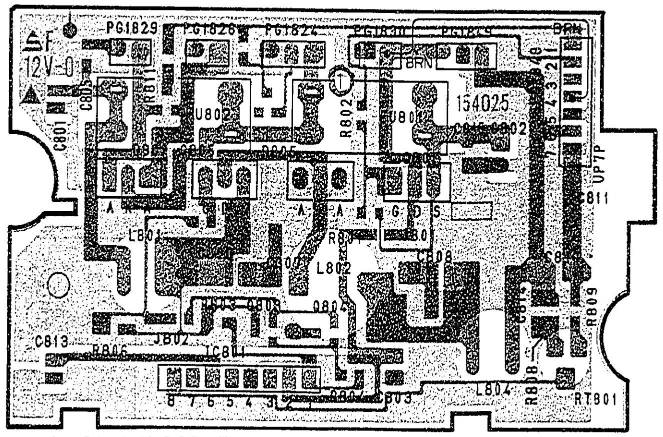
電圧値1コ表示：PB又はRECモード
電圧値2コ表示：PBと(REC)モード
ONE VOLTAGE:PB OR REC MODE
TWO VOLTAGES:PB AND (REC) MODE

NOTE: ADD 2000 TO ALL NUMBERS.
(EXCEPT FOR IC's AND PG's PIN NUMBER)

ノート：実際の回路番号は2000番台が追加になります
(但しIC,PGの端子番号は除きます)

VID(2/2)P.C.B

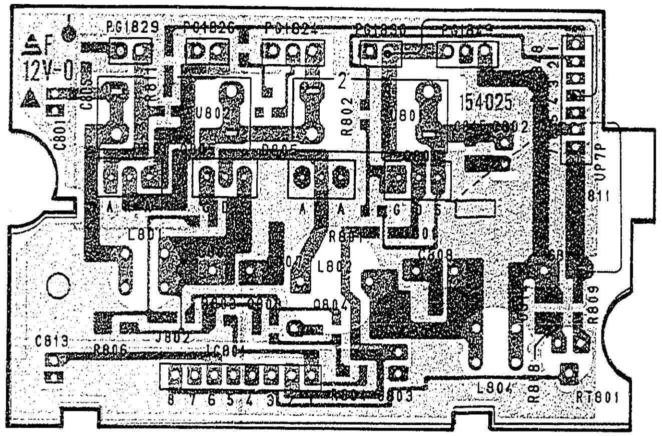
REG CIRCUIT BOARD DIAGRAM- I
(No.154025- 1)


PG1829
PG1826
PG1824
PG1830
PG1829
BRN
12V-0
F
154025
UP7P
C801
R802
U802
U801
L801
L802
L804
C813
R806
JB02
R809
RT801
8 7 6 5 4 3

▨:COMPONENTS SIDE ▩:SOLDER SIDE

REG P.C.B
—SOLDER SIDE—

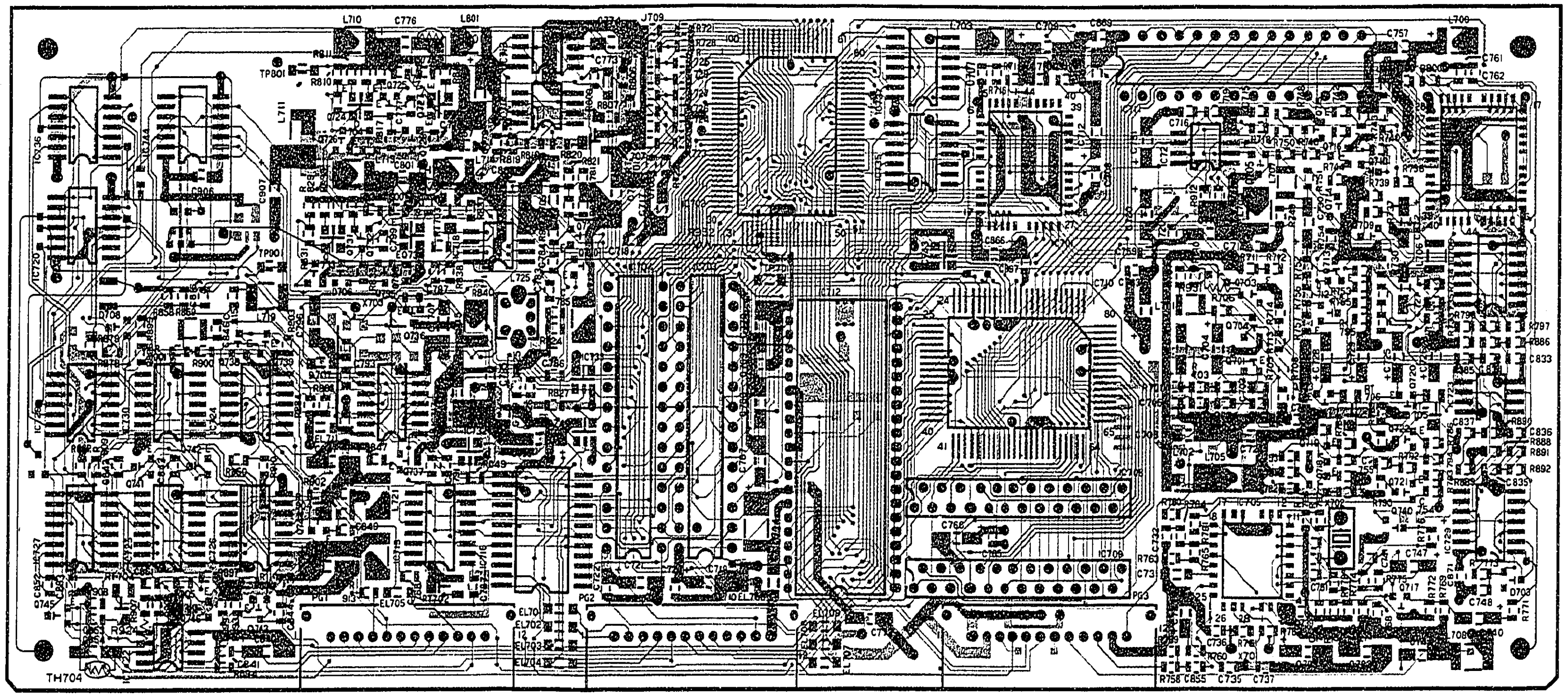
REG CIRCUIT BOARD DIAGRAM- II
(No.154025- 2)


PG1829
PG1826
PG1824
PG1830
PG1829
12V-0
F
154025
UP7P
C801
R802
U802
U801
L801
L802
L804
C813
R806
JB02
R809
RT801
8 7 6 5 4 3

▨:COMPONENTS SIDE ▩:SOLDER SIDE

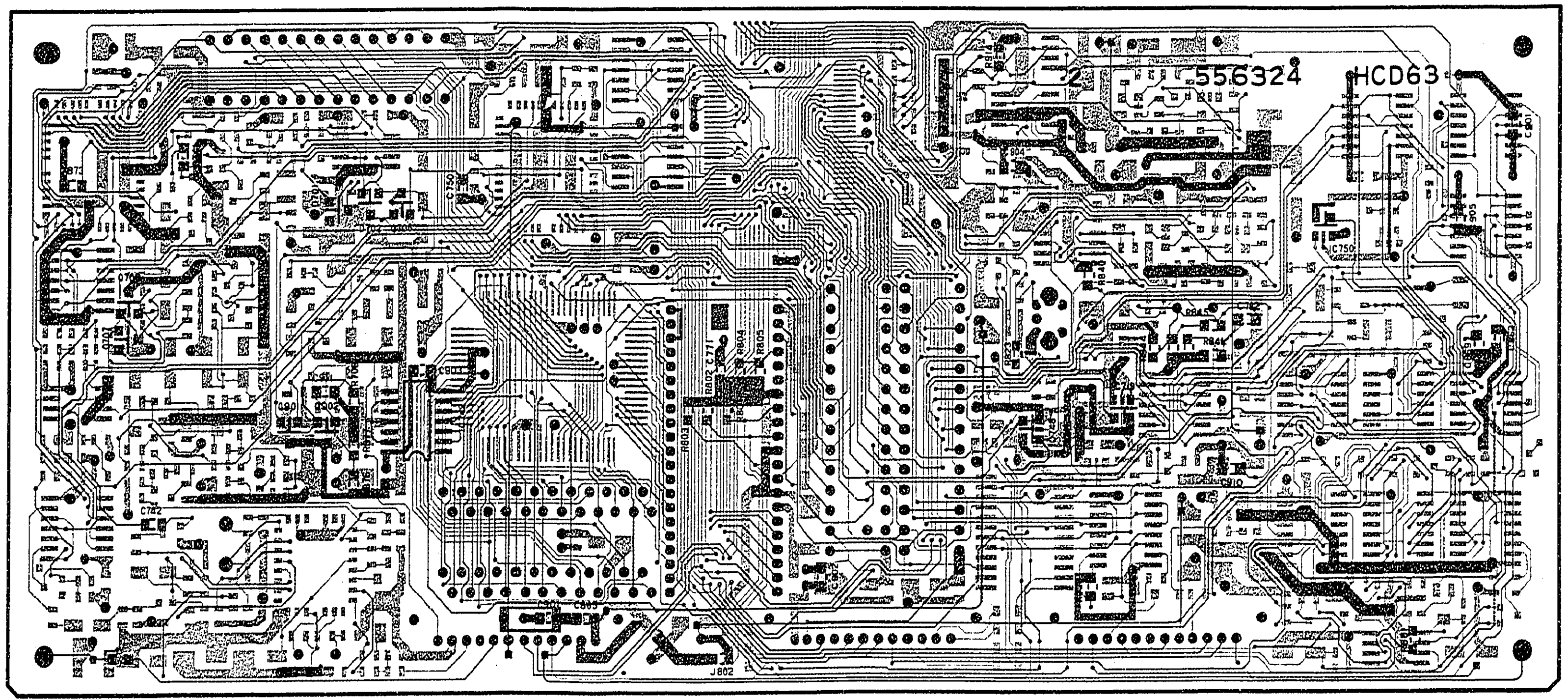
REG P.C.B
—SOLDER SIDE—

DIG CIRCUIT BOARD DIAGRAM-Ⅰ
(No.556324-1)


TH704
TP801
TP901
L710
C776
L601
L709
C757
C761
C762

■:COMPONENTS SIDE ▨:SOLDER SIDE DIG P.C.B —COMPONENTS SIDE—

DIG CIRCUIT BOARD DIAGRAM-Ⅱ
(No.556324-2)

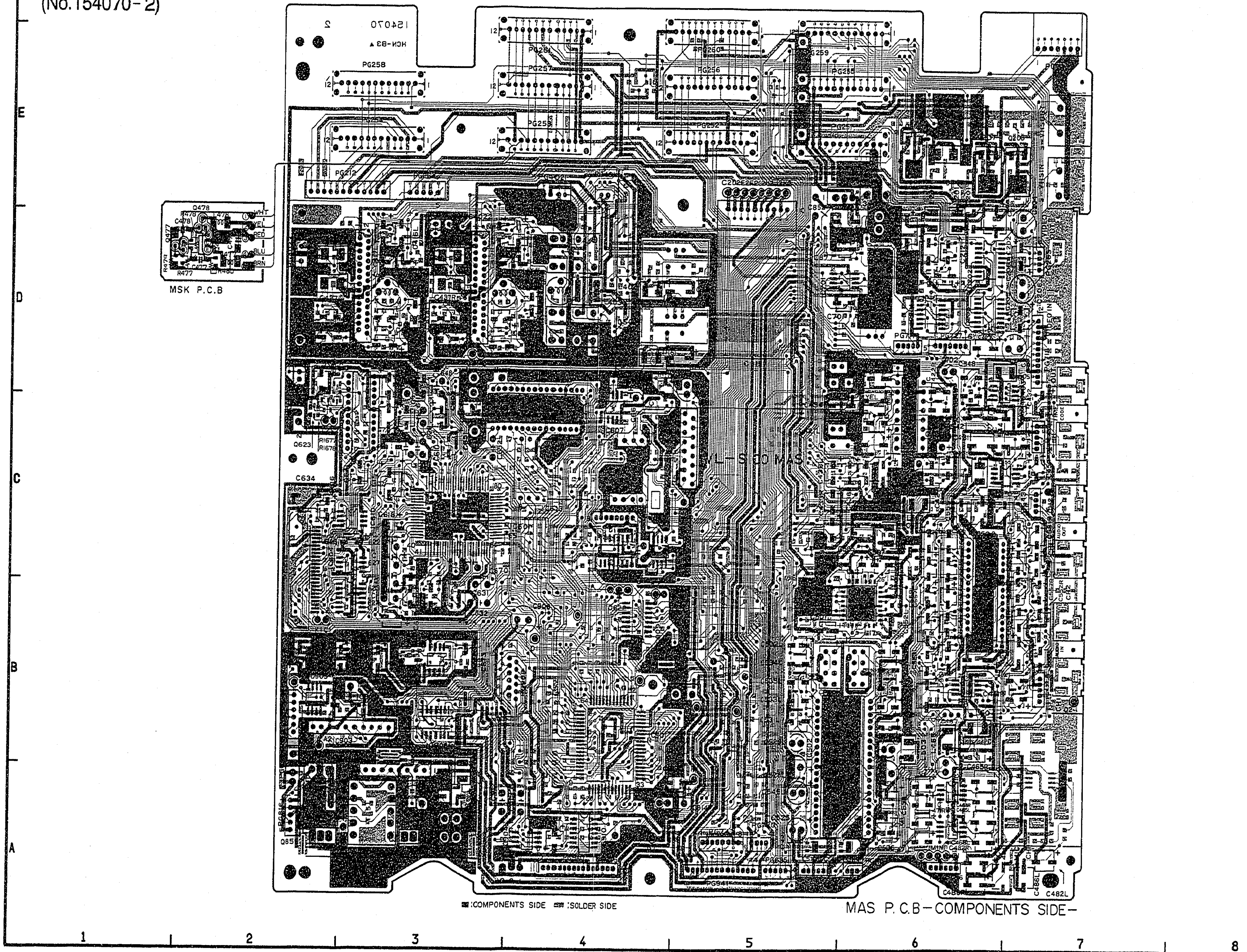

556324 HCD63
J802
IC750

■ :SOLDER SIDE ▨ :COMPONENTS SIDE DIG P.C.B—SOLDER SIDE—

E D C B A

1 2 3 4 5 6 7 8

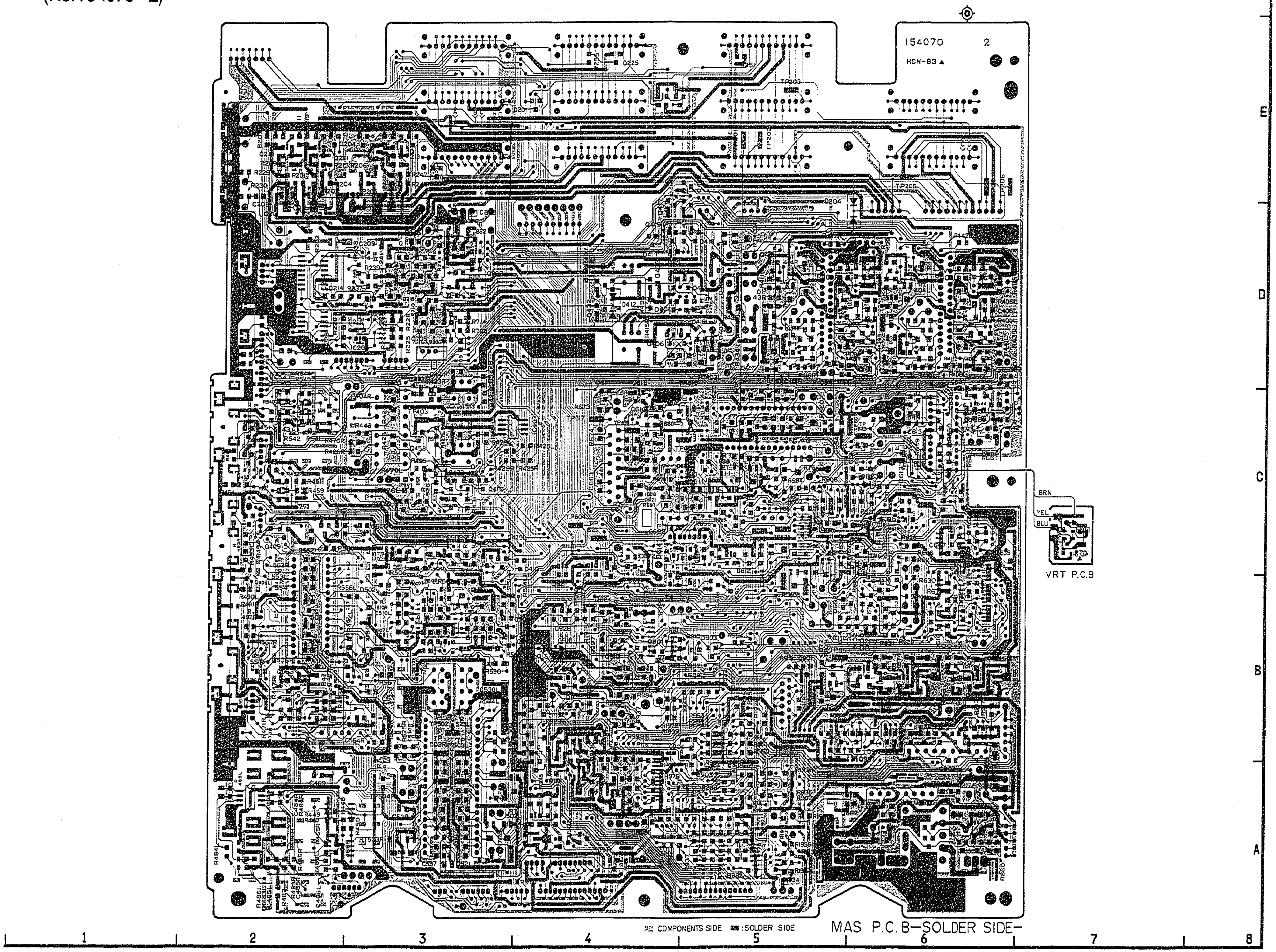
MAS CIRCUIT BOARD DIAGRAM-Ⅱ
(No.154070-2)


E
D
C
B
A
1
2
3
4
5
6
7
8
154070 2
HCN-83
PG258
PG281
PG257
PG260
PG256
PG259
PG255
PG251
PG252
PG212
C2
Q478
Q477
R478
C478
R479
R477
C477
R480
WHT
YEL
RED
BLU
BRN
MSK P.C.B
Q623
R1677
R1678
C634
C707
Q85
C480
C482R
C486L
C482L
VL-S100 MAS

▩:COMPONENTS SIDE ▨:SOLDER SIDE

MAS P.C.B-COMPONENTS SIDE-

MAS CIRCUIT BOARD DIAGRAM-II
(No.154070-2)

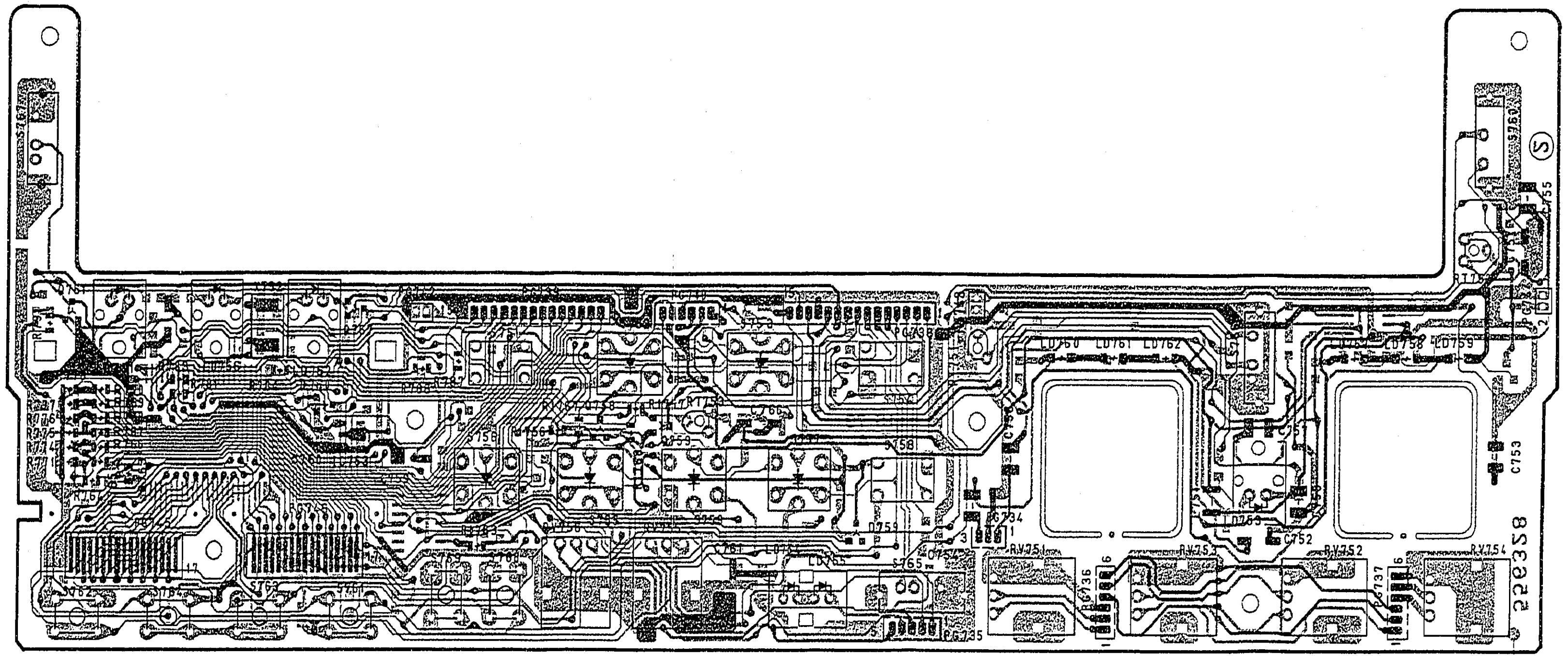

154070 2
HCN-83 ▲
TP203
TP205
D204
BRN
YEL
BLU
VRT P.C.B
E
D
C
B
A
1
2
3
4
5
6
7
8

▨ COMPONENTS SIDE ■ :SOLDER SIDE

MAS P.C.B—SOLDER SIDE—

FUNCTION SW CIRCUIT BOARD DIAGRAM-II

(No.556328-2)

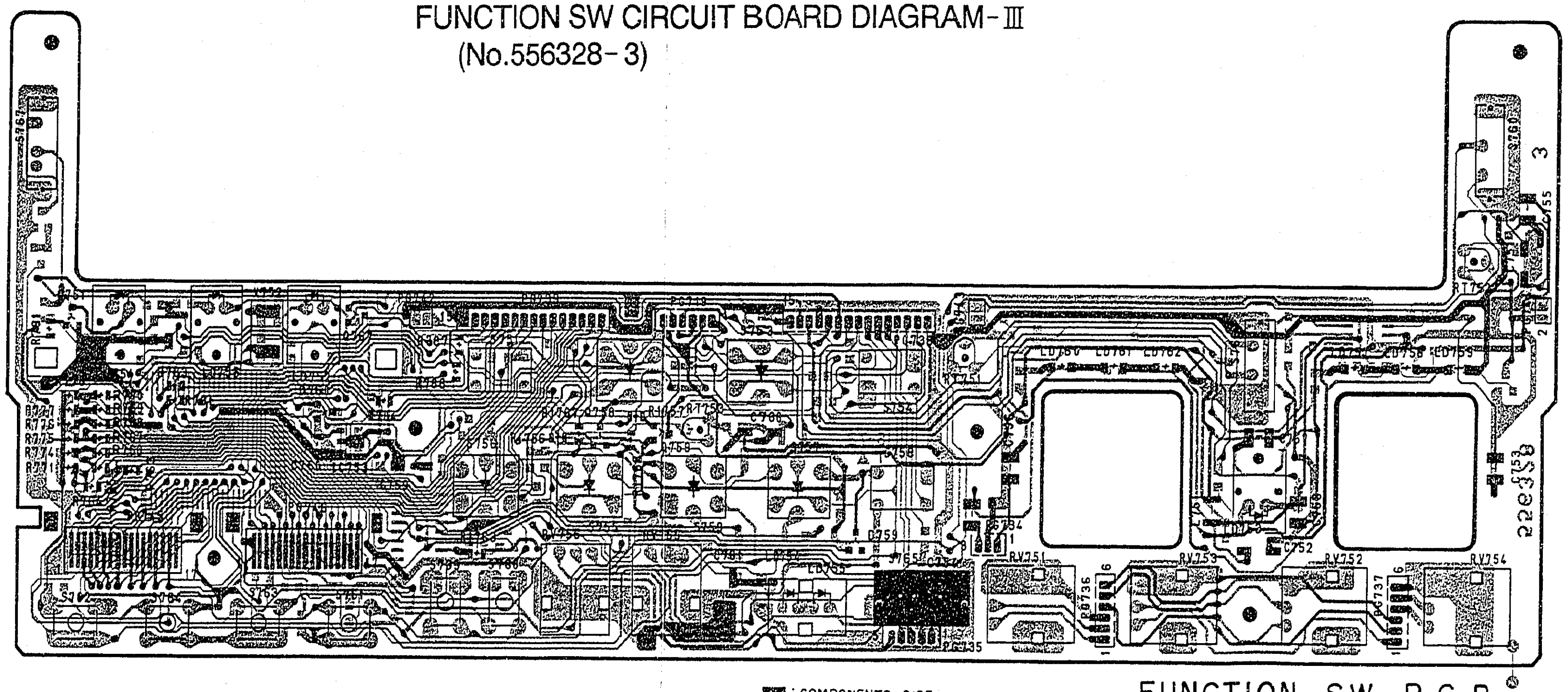

S760
C755
C753
LD760 LD761 LD762
LD758 LD759
RV751
RV752
RV753
RV754
C752
P6736
P6737
P6735
R775
C758
D751

▩ :COMPONENTS SIDE ▨ :SOLDER SIDE

FUNCTION SW P.C.B
—COMPONENTS SIDE—

FUNCTION SW CIRCUIT BOARD DIAGRAM-III

(No.556328-3)


S760
3
C755
C753
LD760 LD761 LD762
LD758 LD759
RV751
RV752
RV753
RV754
C752
P6736
P6737
P6735
R775
C758
D751

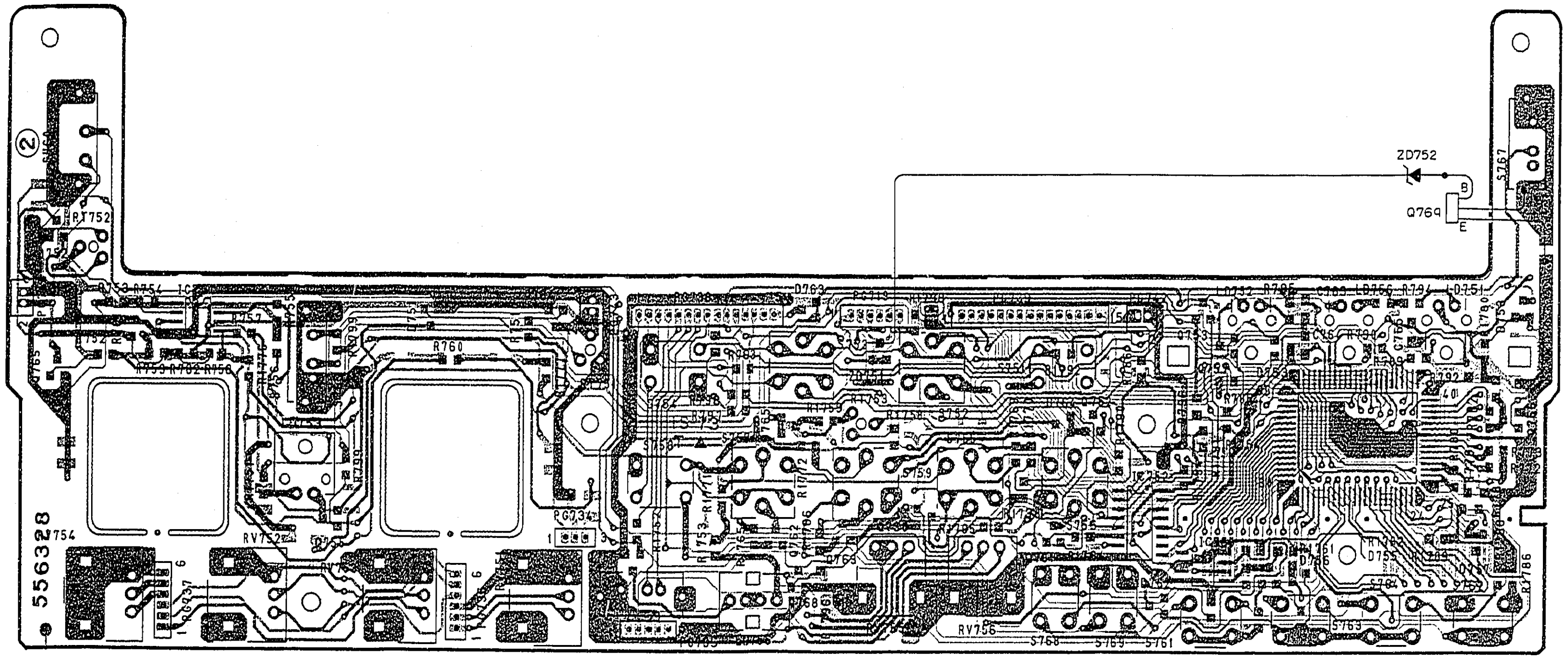
▩ : COMPONENTS SIDE
▨ : SOLDER SIDE

FUNCTION SW P.C.B
— COMPONENTS SIDE —

E
D
C
B
A

1 2 3 4 5 6 7 8

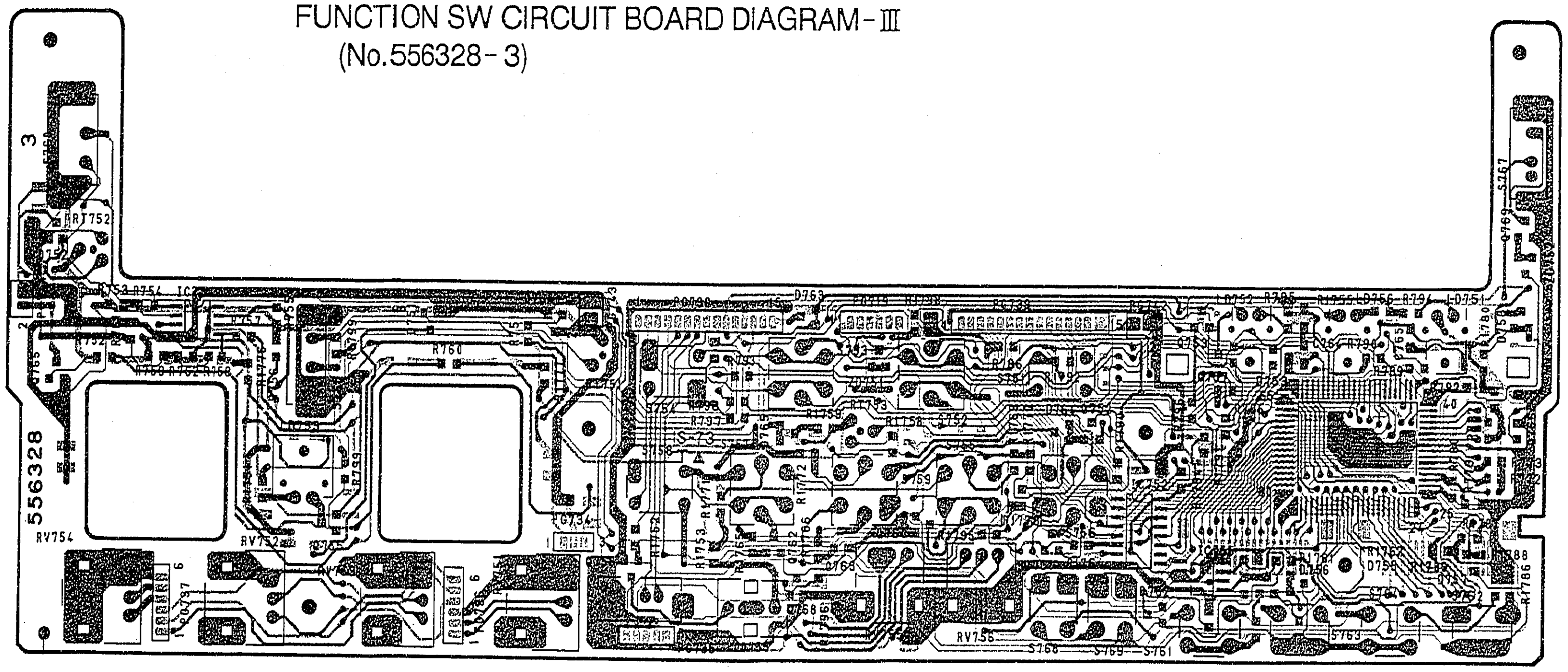
FUNCTION SW CIRCUIT BOARD DIAGRAM - II
(No.556328 - 2)


ZD752
Q769
B
E
②
RT752
R760
556328
RV752
RV756
S767
R1786
S768
S769
S761
S763

▨ : COMPONENTS SIDE ■ : SOLDER SIDE

FUNCTION SW P.C.B
—SOLDER SIDE—

FUNCTION SW CIRCUIT BOARD DIAGRAM - III
(No.556328 - 3)

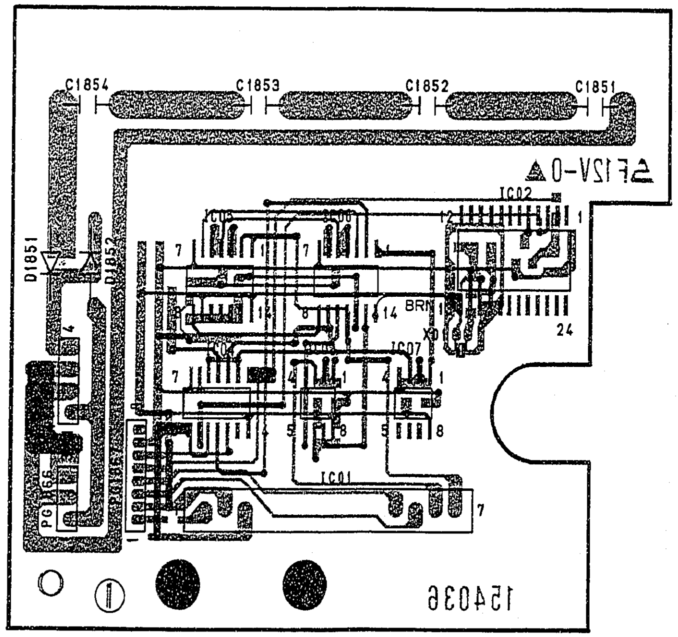

3
RT752
R760
556328
RV754
RV752
RV756
S767
Q769
R1786
S768
S769
S761
S763

▨ : COMPONENTS SIDE
■ : SOLDER SIDE

FUNCTION SW P.C.B
— SOLDER SIDE —

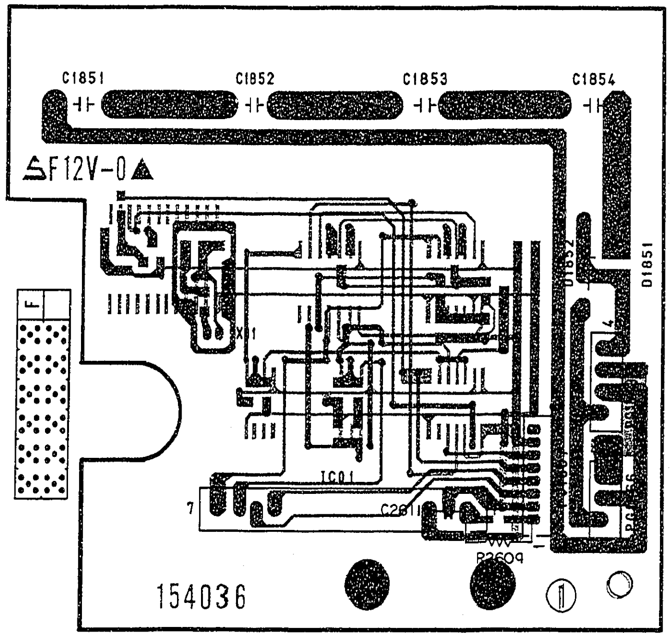
PBK CIRCUIT BOARD DIAGRAM- I
(No.154036- 1)

E


C1854
C1853
C1852
C1851
⚠F12V-0▲
IC02
IC05
IC04
D1851
D1852
BRN
IC07
X01
IC01
PG
154036
1
4
7
8
12
14
24

▩:COMPONENTS SIDE ▩:SOLDER SIDE

PBK P.C.B
COMPONENTS SIDE–


C1851
C1852
C1853
C1854
⚠F12V-0▲
D1852
D1851
X01
IC01
C2611
R2609
PG
154036
1
4
7

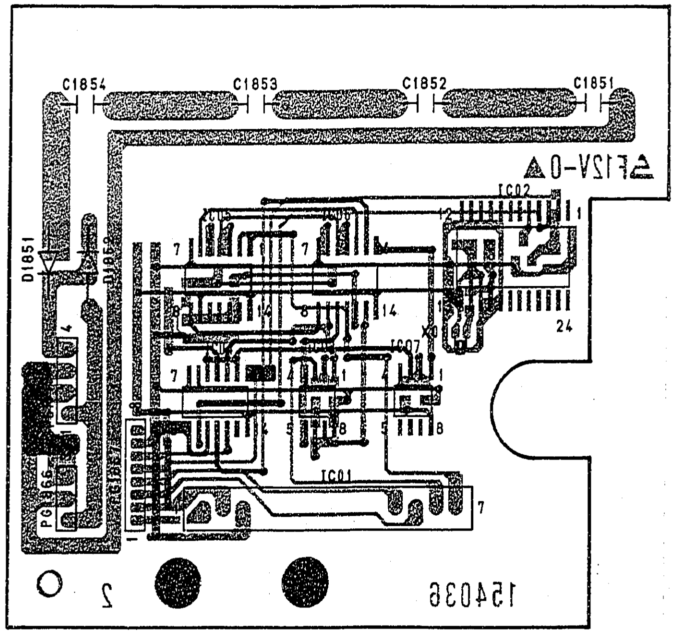
▩:COMPONENTS SIDE ▩:SOLDER SIDE

PBK P.C.B
–SOLDER SIDE–

D

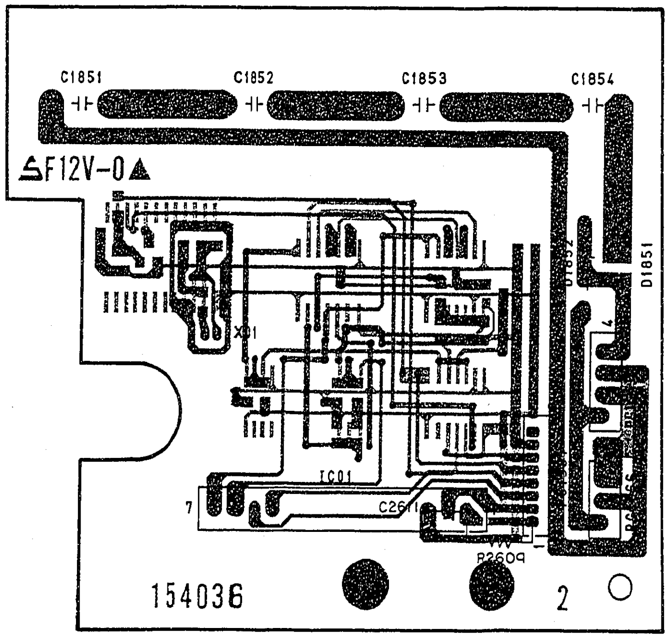
C

PBK CIRCUIT BOARD DIAGRAM- II
(No.154036- 2)


C1854
C1853
C1852
C1851
⚠F12V-0▲
IC02
IC05
IC04
D1851
D1852
IC07
X01
IC01
PG
154036
2
4
7
8
12
14
24

▩:COMPONENTS SIDE ▩:SOLDER SIDE

PBK P.C.B
COMPONENTS SIDE–


C1851
C1852
C1853
C1854
⚠F12V-0▲
D1852
D1851
X01
IC01
C2611
R2609
PG
154036
2
4
7

▩:COMPONENTS SIDE ▩:SOLDER SIDE

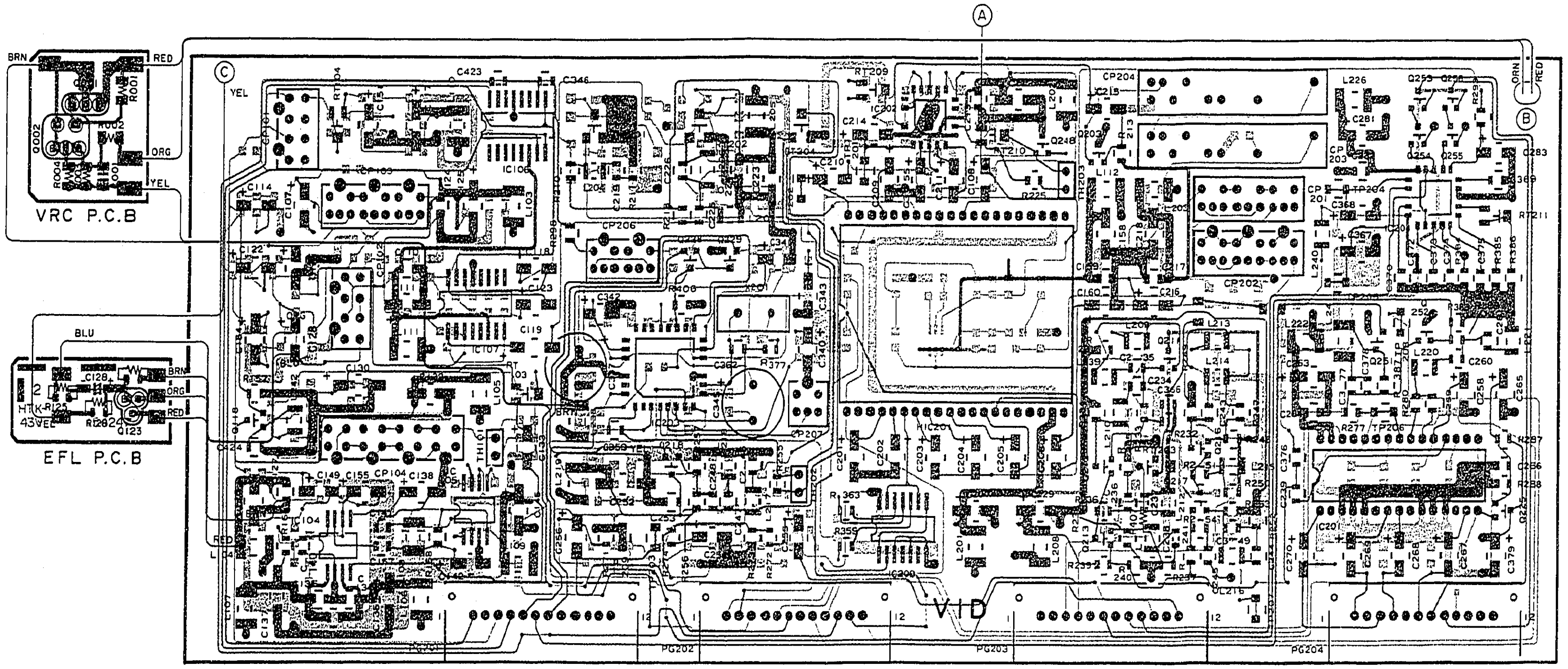
PBK P.C.B
–SOLDER SIDE–

B

A

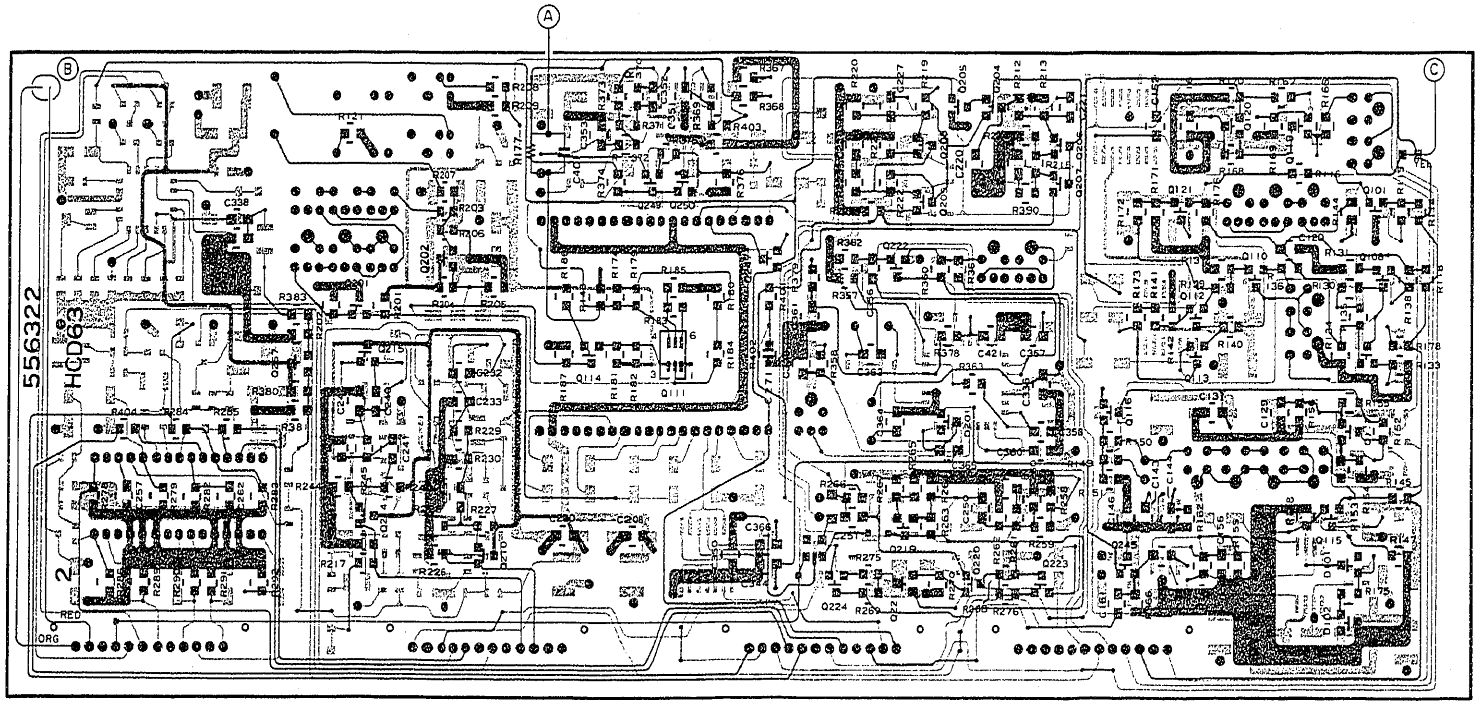
1 2 3 4 5 6 7 8

VID CIRCUIT BOARD DIAGRAM-II
(No.556322-2)


Ⓐ
Ⓑ
Ⓒ
VRC P.C.B
EFL P.C.B
BRN
RED
ORG
YEL
BLU
ORN
VID
PG202
PG203
PG204

■:COMPONENTS SIDE ▨:SOLDER SIDE

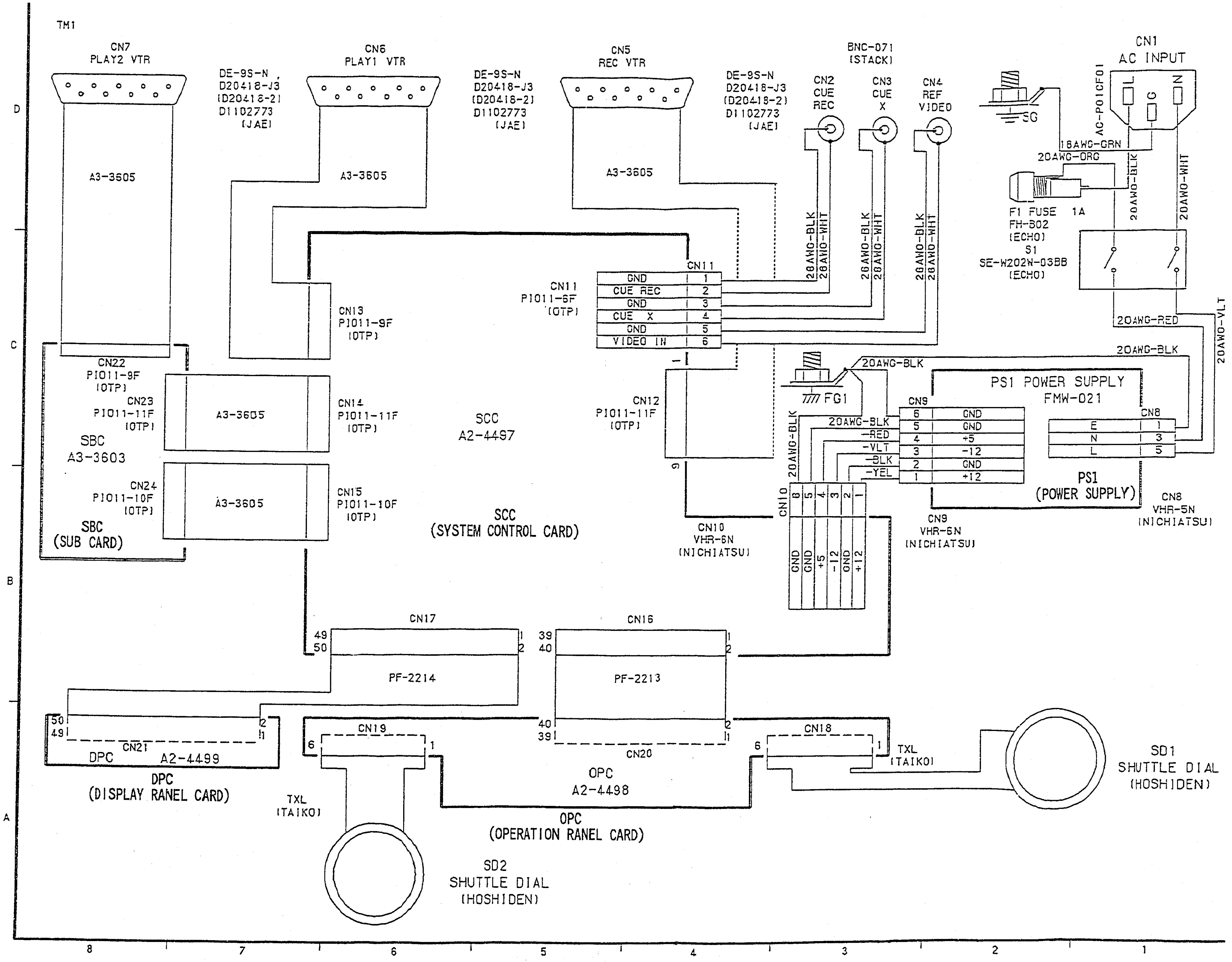
VID P.C.B—COMPONENTS SIDE—


Ⓐ
Ⓑ
Ⓒ
556322
HCD63
ORG
RED

▨:COMPONENTS SIDE ■:SOLDER SIDE

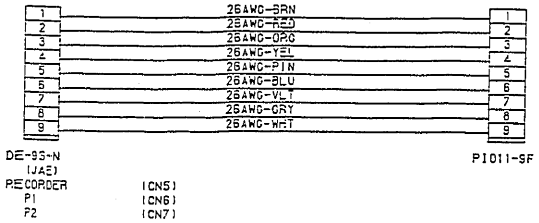
VID P.C.B—SOLDER SIDE—

INTERNAL WIRING DIAGRAM

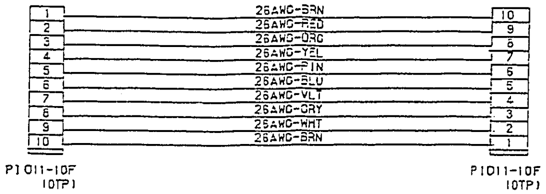

TM1
CN7
PLAY2 VTR
DE-9S-N
D20418-J3
(D20418-2)
D1102773
(JAE)
CN6
PLAY1 VTR
DE-9S-N
D20418-J3
(D20418-2)
D1102773
(JAE)
CN5
REC VTR
DE-9S-N
D20418-J3
(D20418-2)
D1102773
(JAE)
BNC-071
(STACK)
CN2
CUE
REC
CN3
CUE
X
CN4
REF
VIDEO
CN1
AC INPUT
L
G
N
AC-P01CF01
SG
18AWG-GRN
20AWG-ORG
20AWG-BLK
20AWG-WHT
F1 FUSE 1A
FH-802
(ECHO)
S1
SE-W202N-03BB
(ECHO)
A3-3605
A3-3605
A3-3605
26AWG-BLK
26AWG-WHT
26AWG-BLK
26AWG-WHT
26AWG-BLK
26AWG-WHT
CN11
CN11
PI011-6F
(OTP)
GND 1
CUE REC 2
GND 3
CUE X 4
GND 5
VIDEO IN 6
20AWG-RED
20AWG-VLT
20AWG-BLK
CN13
PI011-9F
(OTP)
CN22
PI011-9F
(OTP)
CN23
PI011-11F
(OTP)
A3-3605
CN14
PI011-11F
(OTP)
SBC
A3-3603
SCC
A2-4497
CN12
PI011-11F
(OTP)
20AWG-BLK
FG1
PS1 POWER SUPPLY
FMW-021
CN9
6 GND
5 GND
4 +5
3 -12
2 GND
1 +12
20AWG-BLK
-RED
-VLT
-BLK
-YEL
CN8
E 1
N 3
L 5
PS1
(POWER SUPPLY)
CN8
VHR-5N
(NICHIATSU)
CN9
VHR-6N
(NICHIATSU)
20AWG-BLK
CN10
6 5 4 3 2 1
GND GND +5 -12 GND +12
CN10
VHR-6N
(NICHIATSU)
6
CN24
PI011-10F
(OTP)
A3-3605
CN15
PI011-10F
(OTP)
SBC
(SUB CARD)
SCC
(SYSTEM CONTROL CARD)
CN17
49 50 1 2
PF-2214
CN16
39 40 1 2
PF-2213
50 49 2 1
CN21
DPC A2-4499
DPC
(DISPLAY RANEL CARD)
CN19
6 1
40 39 2 1
CN20
CN18
6 1
TXL
(TAIKO)
OPC
A2-4498
OPC
(OPERATION RANEL CARD)
TXL
(TAIKO)
SD1
SHUTTLE DIAL
(HOSHIDEN)
SD2
SHUTTLE DIAL
(HOSHIDEN)
D
C
B
A
8
7
6
5
4
3
2
1

WIRING CABLE

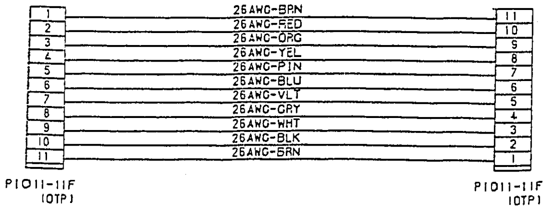
1. ▪CN5−CN12 CABLE L=180mm (VL−EC10/20)
   ▪CN6−CN13 CABLE L= 80mm (VL−EC10/20)
   ▪CN7−CN22 CABLE L= 80mm (VL−EC20)


1
2
3
4
5
6
7
8
9
26AWG−BRN
26AWG−RED
26AWG−ORG
26AWG−YEL
26AWG−PIN
26AWG−BLU
26AWG−VLT
26AWG−GRY
26AWG−WHT
DE−9S−N
(JAE)
RECORDER (CN5)
P1 (CN6)
P2 (CN7)
PI011−9F

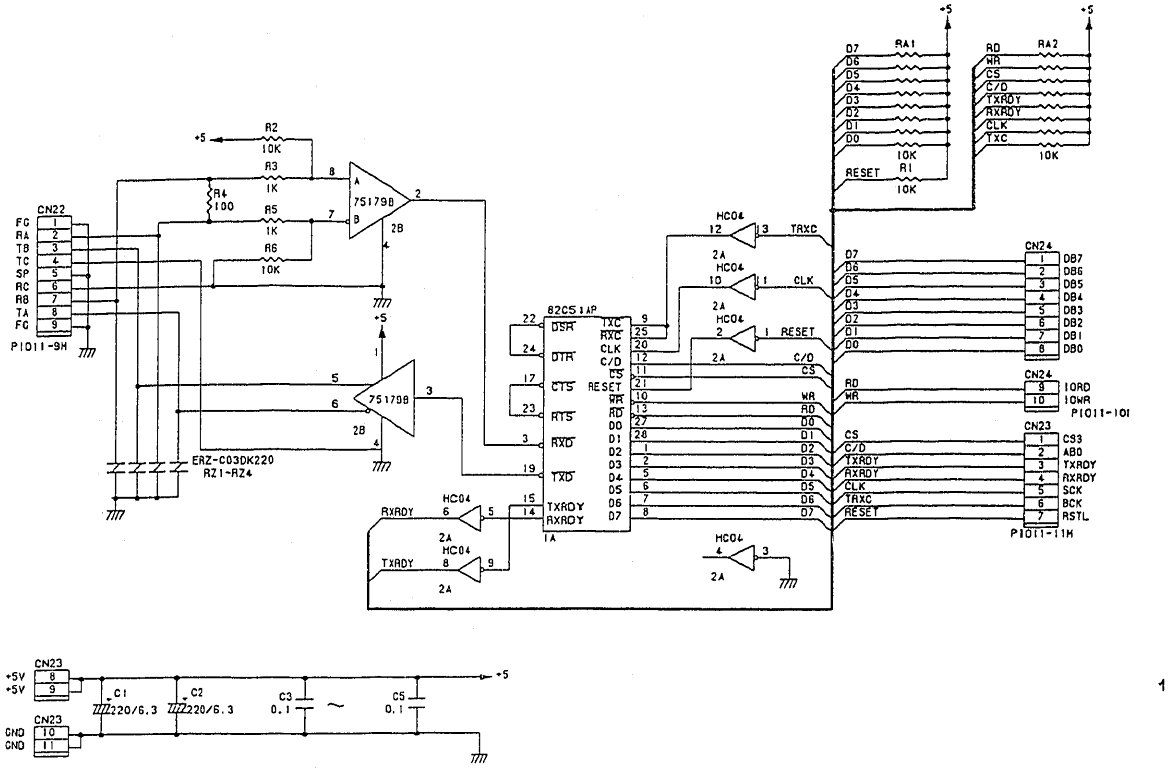
2. ▪CN15−CN24 CABLE L= 50mm (VL−EC20)


1
2
3
4
5
6
7
8
9
10
26AWG−BRN
26AWG−RED
26AWG−ORG
26AWG−YEL
26AWG−PIN
26AWG−BLU
26AWG−VLT
26AWG−GRY
26AWG−WHT
26AWG−BRN
10
9
8
7
6
5
4
3
2
1
PI011−10F
(OTP)
PI011−10F
(OTP)

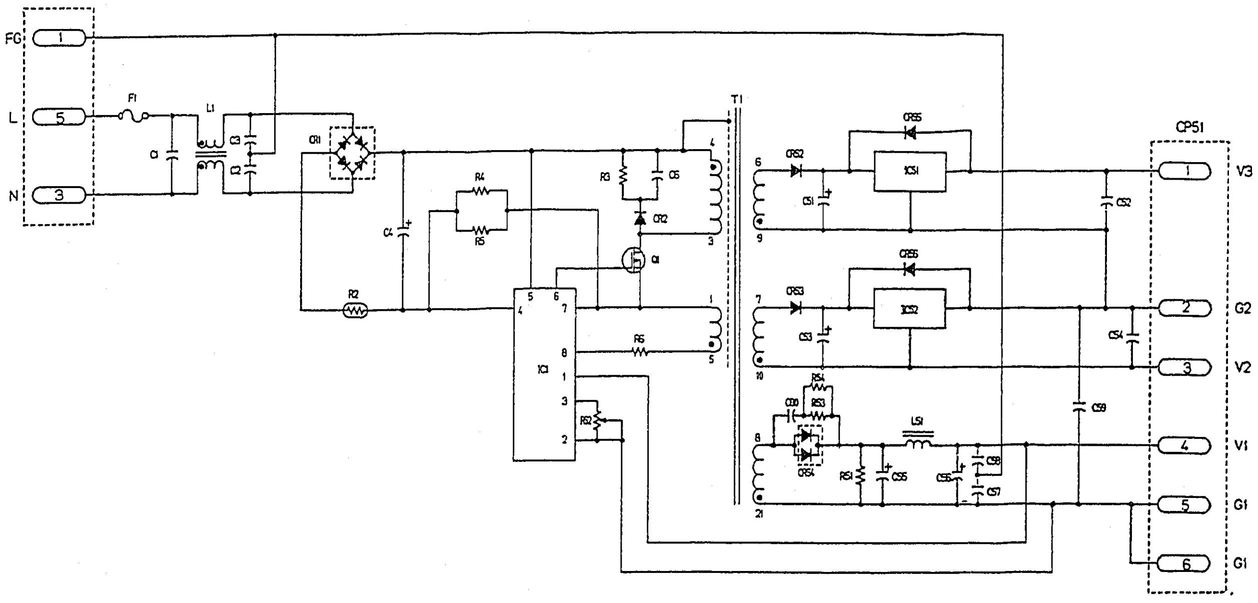
3. ▪CN14−CN23 CABLE L= 50mm (VL−EC20)


1
2
3
4
5
6
7
8
9
10
11
26AWG−BRN
26AWG−RED
26AWG−ORG
26AWG−YEL
26AWG−PIN
26AWG−BLU
26AWG−VLT
26AWG−GRY
26AWG−WHT
26AWG−BLK
26AWG−BRN
11
10
9
8
7
6
5
4
3
2
1
PI011−11F
(OTP)
PI011−11F
(OTP)

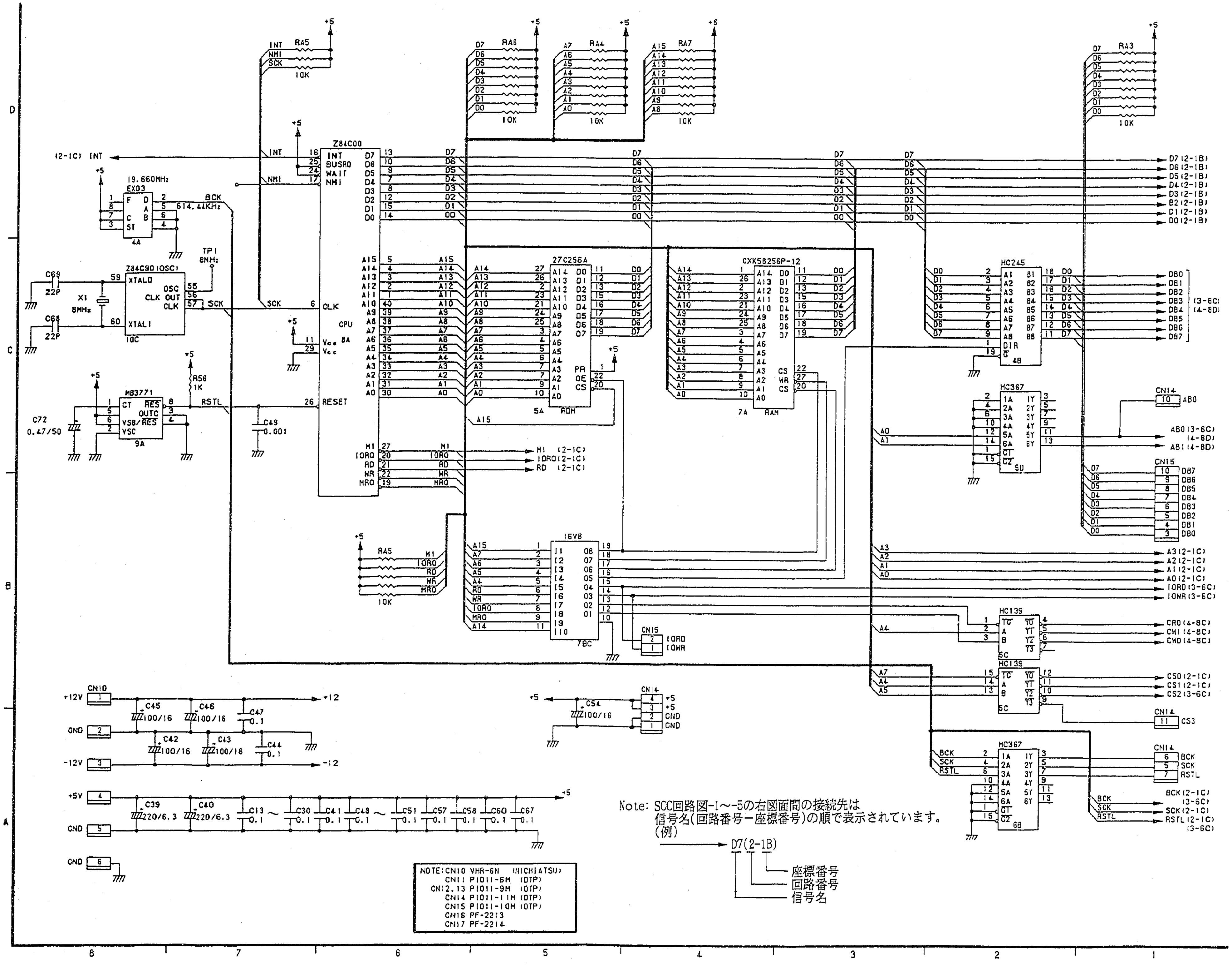
SBC(SUB CARD)SCHEMATIC DIAGRAM


CN22
FG
RA
TB
TC
SP
RC
RB
TA
FG
PI011−9H
+5
R2
10K
R3
1K
R4
100
R5
1K
R6
10K
751798
A
B
2B
751798
ERZ−C03DK220
RZ1−RZ4
82C51AP
DSR
DTR
CTS
RTS
RXD
TXD
TXRDY
RXRDY
TXC
RXC
CLK
C/D
CS
RESET
WR
RD
D0
D1
D2
D3
D4
D5
D6
D7
1A
HC04
2A
TRXC
CLK
RESET
RXRDY
TXRDY
RA1
RA2
R1
10K
CN24
DB7
DB6
DB5
DB4
DB3
DB2
DB1
DB0
IORD
IOWR
PI011−10I
CN23
CS3
AB0
TXRDY
RXRDY
SCK
BCK
RSTL
PI011−11H
CN23
+5V
+5V
GND
GND
C1
220/6.3
C2
220/6.3
C3
0.1
C5
0.1
+5

PS1(POWER SUPPLY)SCHEMATIC DIAGRAM


CP1
FG
L
N
1
5
3
F1
L1
C1
C2
C3
CR1
C4
R2
R4
R5
R3
C5
CR2
Q1
IC1
RS2
R6
T1
CR52
CR55
IC51
C51
C52
CR53
CR56
IC52
C53
C54
C59
RS4
RS3
C50
CR54
RS1
C55
L51
C56
C58
C57
CP51
V3
G2
V2
V1
G1
G1

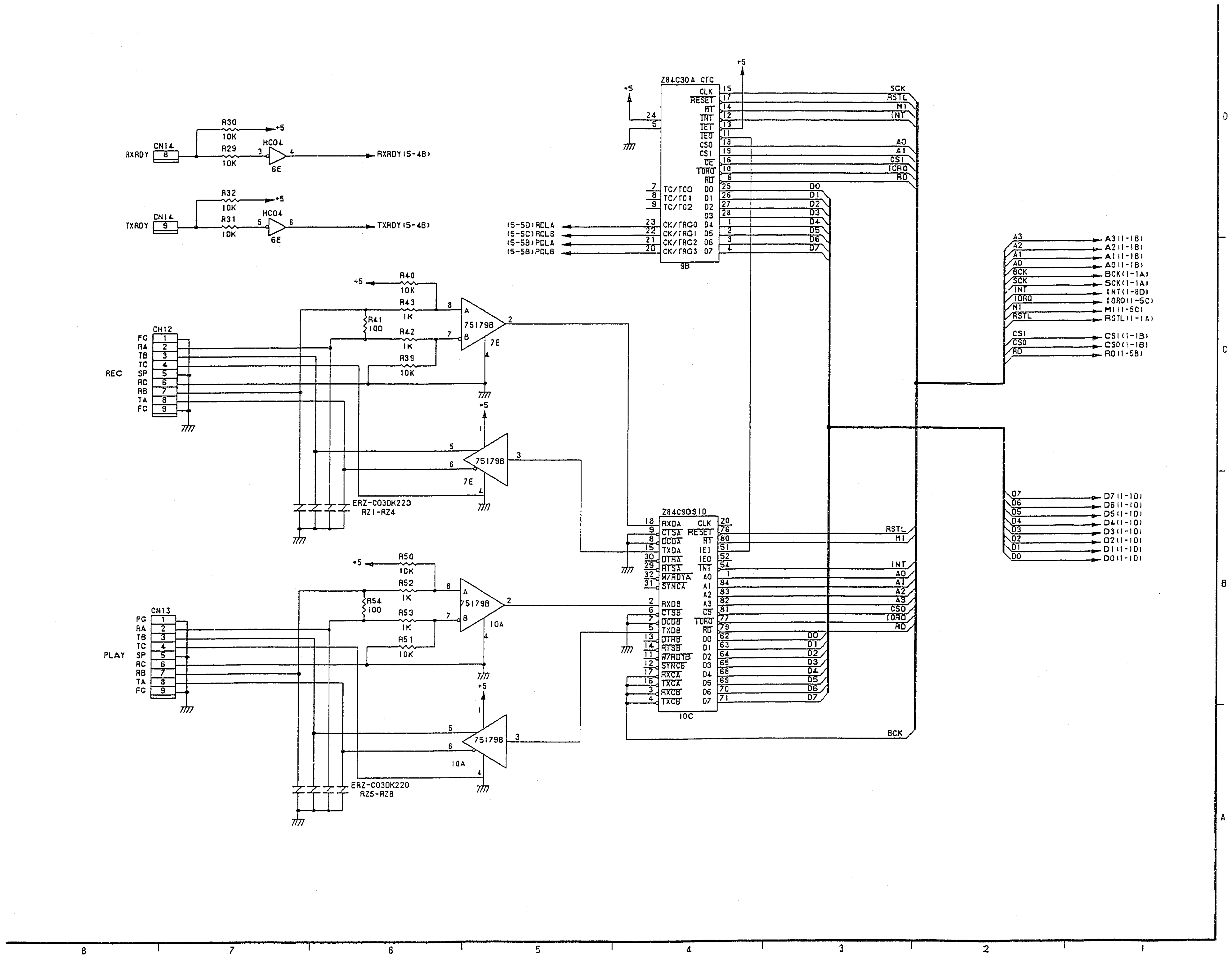
SCC(SYSTEM CONTROL CARD)SCHEMATIC DIAGRAM – 1


Z84C00
CPU
8A
Z84C90(OSC)
10C
X1
8MHz
TP1
8MHz
EXO3
19.660MHz
4A
BCK
614.44KHz
MB3771
9A
RA56
1K
C72
0.47/50
C49
0.001
C69
22P
C68
22P
RA5
10K
RA6
RA4
RA7
RA3
10K
27C256A
5A
ROM
CXK58256P-12
7A
RAM
16V8
7BC
HC245
4B
HC367
5D
6B
HC139
5C
CN10
CN14
CN15
+12V
GND
-12V
+5V
C45
100/16
C46
100/16
C47
0.1
C42
100/16
C43
100/16
C44
0.1
C39
220/6.3
C40
220/6.3
C13
C30
C41
C48
C51
C57
C58
C60
C67
0.1
C54
100/16
(2-1C) INT
D7(2-1B)
D6(2-1B)
D5(2-1B)
D4(2-1B)
D3(2-1B)
B2(2-1B)
D1(2-1B)
D0(2-1B)
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7
(3-6C)
(4-8D)
AB0
AB0(3-6C)
(4-8D)
AB1(4-8D)
M1 (2-1C)
IORQ(2-1C)
RD (2-1C)
A3(2-1C)
A2(2-1C)
A1(2-1C)
A0(2-1C)
IORD(3-6C)
IOWR(3-6C)
CR0(4-8C)
CH1(4-8C)
CHD(4-8C)
CS0(2-1C)
CS1(2-1C)
CS2(3-6C)
CS3
BCK
SCK
RSTL
BCK(2-1C)
(3-6C)
SCK(2-1C)
RSTL(2-1C)
(3-6C)
D
C
B
A
8
7
6
5
4
3
2
1

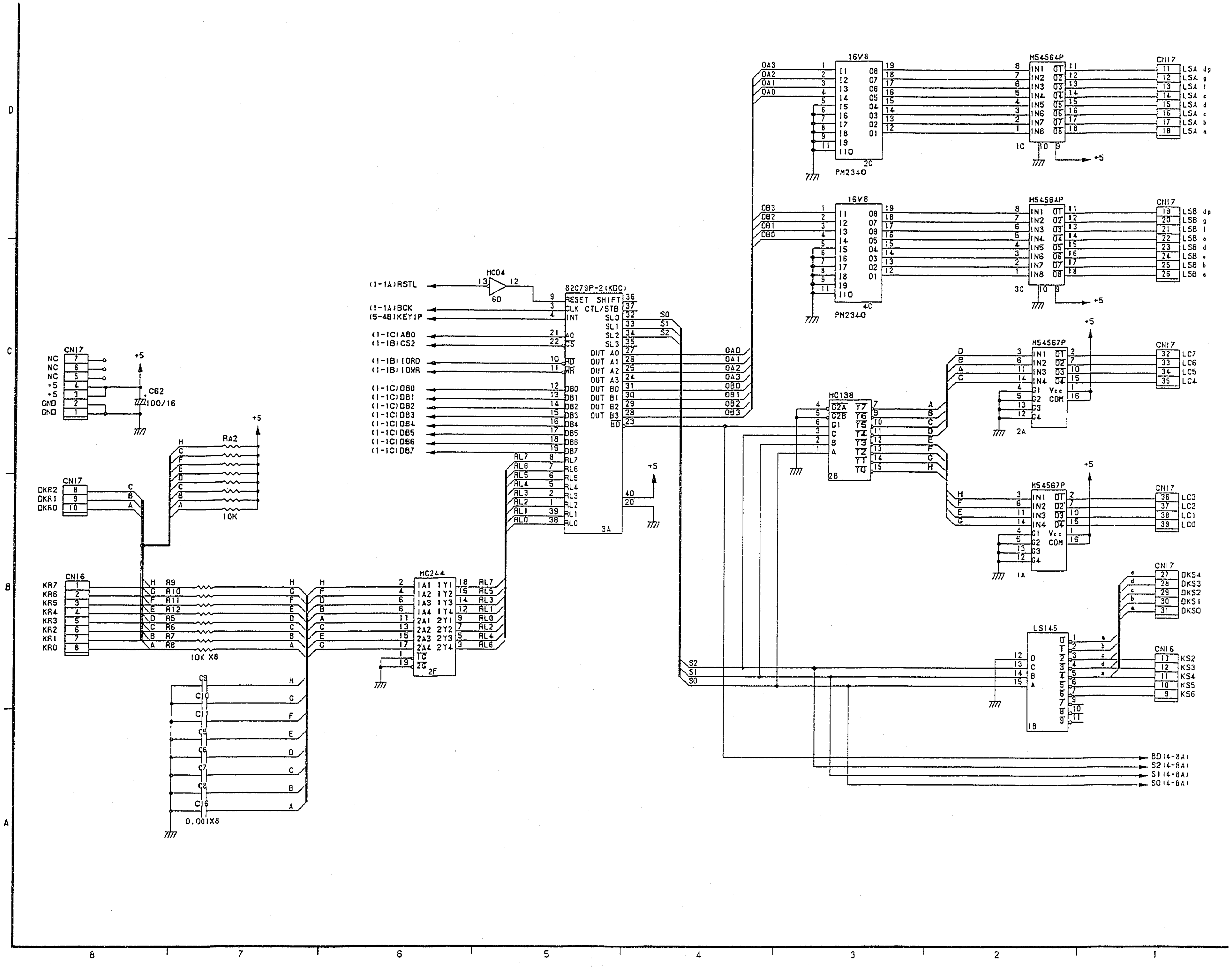
Note: SCC回路図-1～-5の右図面間の接続先は
信号名(回路番号ー座標番号)の順で表示されています。
(例)
→ D7(2-1B)
座標番号
回路番号
信号名

NOTE:CN10 VHR-6N (NICHIATSU)
CN11 P1011-6M (OTP)
CN12.13 P1011-9M (OTP)
CN14 P1011-11M (OTP)
CN15 P1011-10M (OTP)
CN16 PF-2213
CN17 PF-2214

SCC(SYSTEM CONTROL CARD)SCHEMATIC DIAGRAM – 2

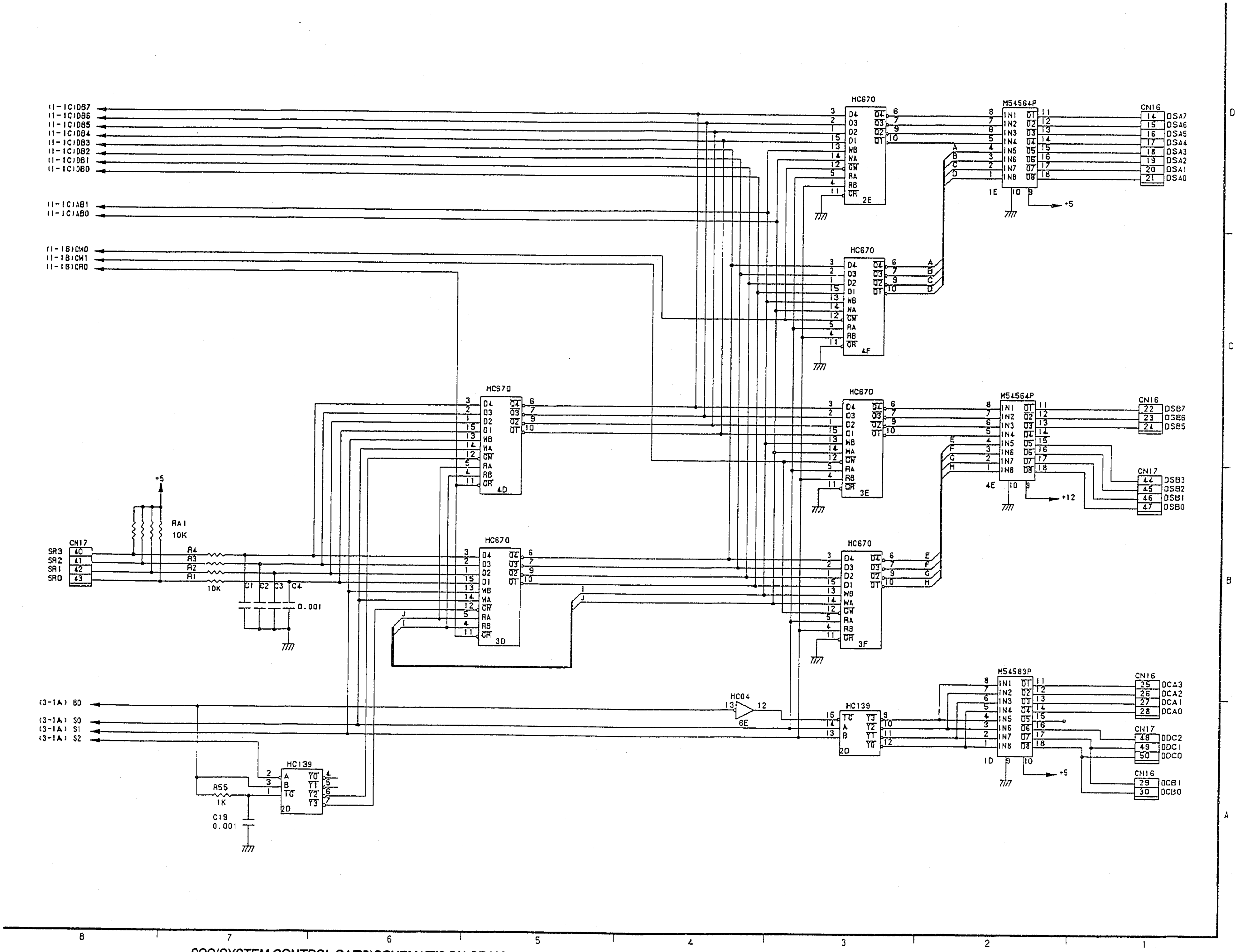

RXRDY
CN14
8
R30
10K
+5
R29
10K
HC04
3
4
6E
RXRDY (5-4B)
TXRDY
CN14
9
R32
10K
+5
R31
10K
HC04
5
6
6E
TXRDY (5-4B)
Z84C30A CTC
+5
24
5
CLK 15 SCK
RESET 17 RSTL
M1 14 M1
INT 12 INT
IEI 13
IEO 11
CS0 18 A0
CS1 19 A1
CE 16 CS1
IORQ 10 IORQ
RD 6 RD
7 TC/TO0 D0 25 D0
8 TC/TO1 D1 26 D1
9 TC/TO2 D2 27 D2
D3 28 D3
(5-5D) RDLA 23 CK/TRG0 D4 1 D4
(5-5C) RDLB 22 CK/TRG1 D5 2 D5
(5-5B) PDLA 21 CK/TRG2 D6 3 D6
(5-5B) PDLB 20 CK/TRG3 D7 4 D7
9B
+5
R40
10K
R43
1K
R41
100
R42
1K
R39
10K
75179B
7E
8
7
2
4
A
B
CN12
REC
FG 1
RA 2
TB 3
TC 4
SP 5
RC 6
RB 7
TA 8
FG 9
+5
1
5
6
75179B
3
7E
4
ERZ-C03DK220
RZ1-RZ4
+5
R50
10K
R52
1K
R54
100
R53
1K
R51
10K
75179B
10A
8
7
2
4
A
B
CN13
PLAY
FG 1
RA 2
TB 3
TC 4
SP 5
RC 6
RB 7
TA 8
FG 9
+5
1
5
6
75179B
3
10A
4
ERZ-C03DK220
RZ5-RZ8
Z84C90S10
18 RXDA CLK 20
9 CTSA RESET 76 RSTL
8 DCDA M1 80 M1
15 TXDA IEI 51
30 DTRA IEO 52
29 RTSA INT 54 INT
32 W/RDYA A0 1 A0
31 SYNCA A1 84 A1
A2 83 A2
2 RXDB A3 82 A3
6 CTSB CS 81 CS0
7 DCDB IORQ 77 IORQ
5 TXDB RD 79 RD
13 DTRB D0 62 D0
14 RTSB D1 63 D1
11 W/RDYB D2 64 D2
12 SYNCB D3 65 D3
17 RXCA D4 68 D4
16 TXCA D5 69 D5
3 RXCB D6 70 D6
4 TXCB D7 71 D7
10C
BCK
A3 A3 (1-1B)
A2 A2 (1-1B)
A1 A1 (1-1B)
A0 A0 (1-1B)
BCK BCK (1-1A)
SCK SCK (1-1A)
INT INT (1-8D)
IORQ IORQ (1-5C)
M1 M1 (1-5C)
RSTL RSTL (1-1A)
CS1 CS1 (1-1B)
CS0 CS0 (1-1B)
RD RD (1-5B)
D7 D7 (1-1D)
D6 D6 (1-1D)
D5 D5 (1-1D)
D4 D4 (1-1D)
D3 D3 (1-1D)
D2 D2 (1-1D)
D1 D1 (1-1D)
D0 D0 (1-1D)
D
C
B
A
8
7
6
5
4
3
2
1

SCC(SYSTEM CONTROL CARD)SCHEMATIC DIAGRAM – 3

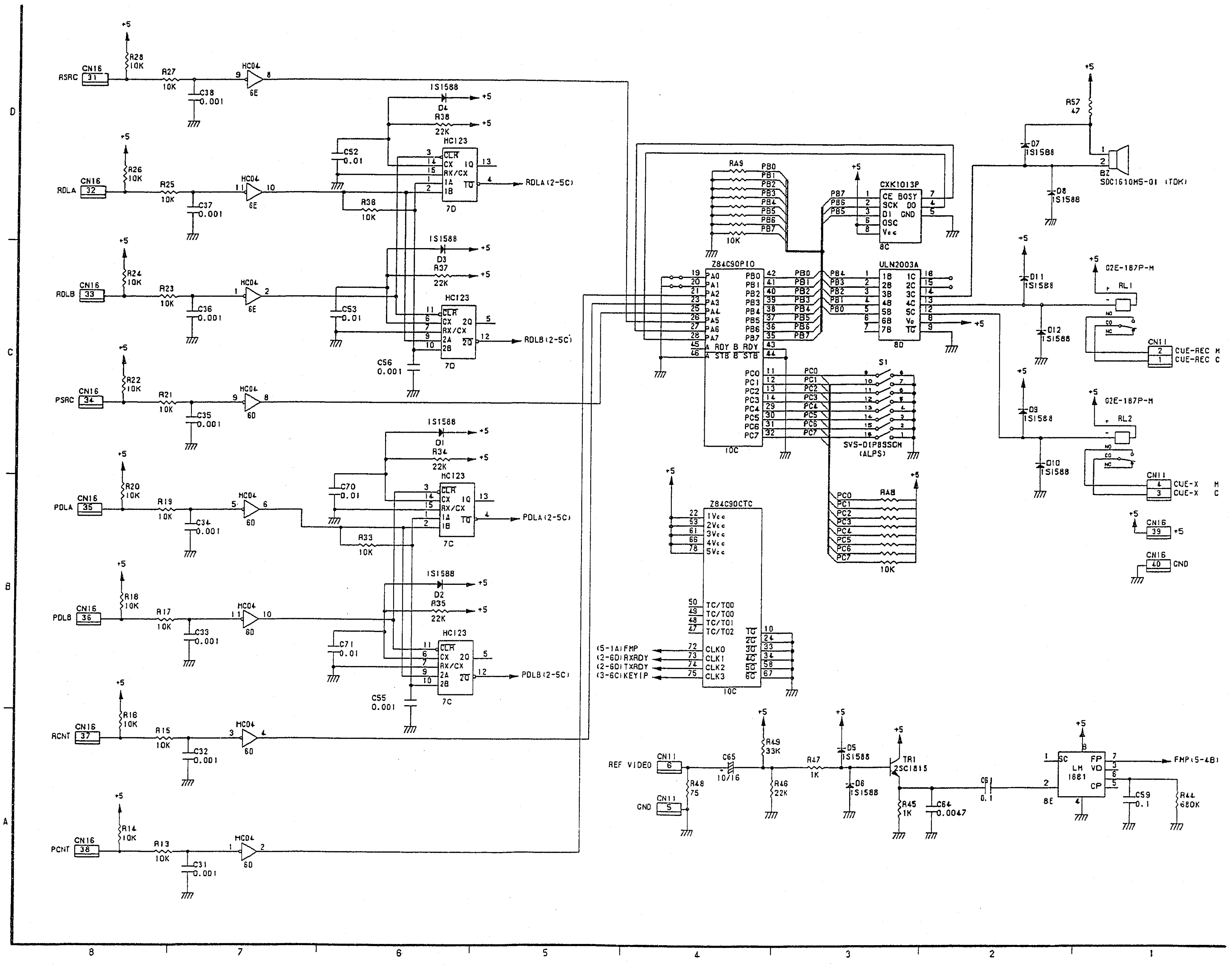


82C79P-2(KDC)
RESET SHIFT
CLK CTL/STB
INT
SL0 SL1 SL2 SL3
OUT A0 OUT A1 OUT A2 OUT A3
OUT B0 OUT B1 OUT B2 OUT B3
BD
3A
HC04
6D
(1-1A)RSTL
(1-1A)BCK
(5-4B)KEY1P
(1-1C)A80
(1-1B)CS2
(1-1B)IORD
(1-1B)IOWR
(1-1C)DB0
(1-1C)DB1
(1-1C)DB2
(1-1C)DB3
(1-1C)DB4
(1-1C)DB5
(1-1C)DB6
(1-1C)DB7
RL7 RL6 RL5 RL4 RL3 RL2 RL1 RL0
16V8
2C
4C
PM2340
M54564P
1C
3C
+5
CN17
LSA dp
LSA g
LSA f
LSA e
LSA d
LSA c
LSA b
LSA a
LSB dp
LSB g
LSB f
LSB e
LSB d
LSB c
LSB b
LSB a
OA0 OA1 OA2 OA3
OB0 OB1 OB2 OB3
HC138
2B
M54567P
2A
1A
LC7 LC6 LC5 LC4
LC3 LC2 LC1 LC0
DKS4 DKS3 DKS2 DKS1 DKS0
LS145
1B
CN16
KS2 KS3 KS4 KS5 KS6
BD(4-8A)
S2(4-8A)
S1(4-8A)
S0(4-8A)
S0 S1 S2
HC244
2F
CN17
NC NC NC +5 +5 GND GND
C62
100/16
DKR2 DKR1 DKR0
RA2
10K
CN16
KR7 KR6 KR5 KR4 KR3 KR2 KR1 KR0
R9 R10 R11 R12 R5 R6 R7 R8
10K X8
C9 C10 C11 C5 C6 C7 C8 C16
0.001X8
D C B A
8 7 6 5 4 3 2 1

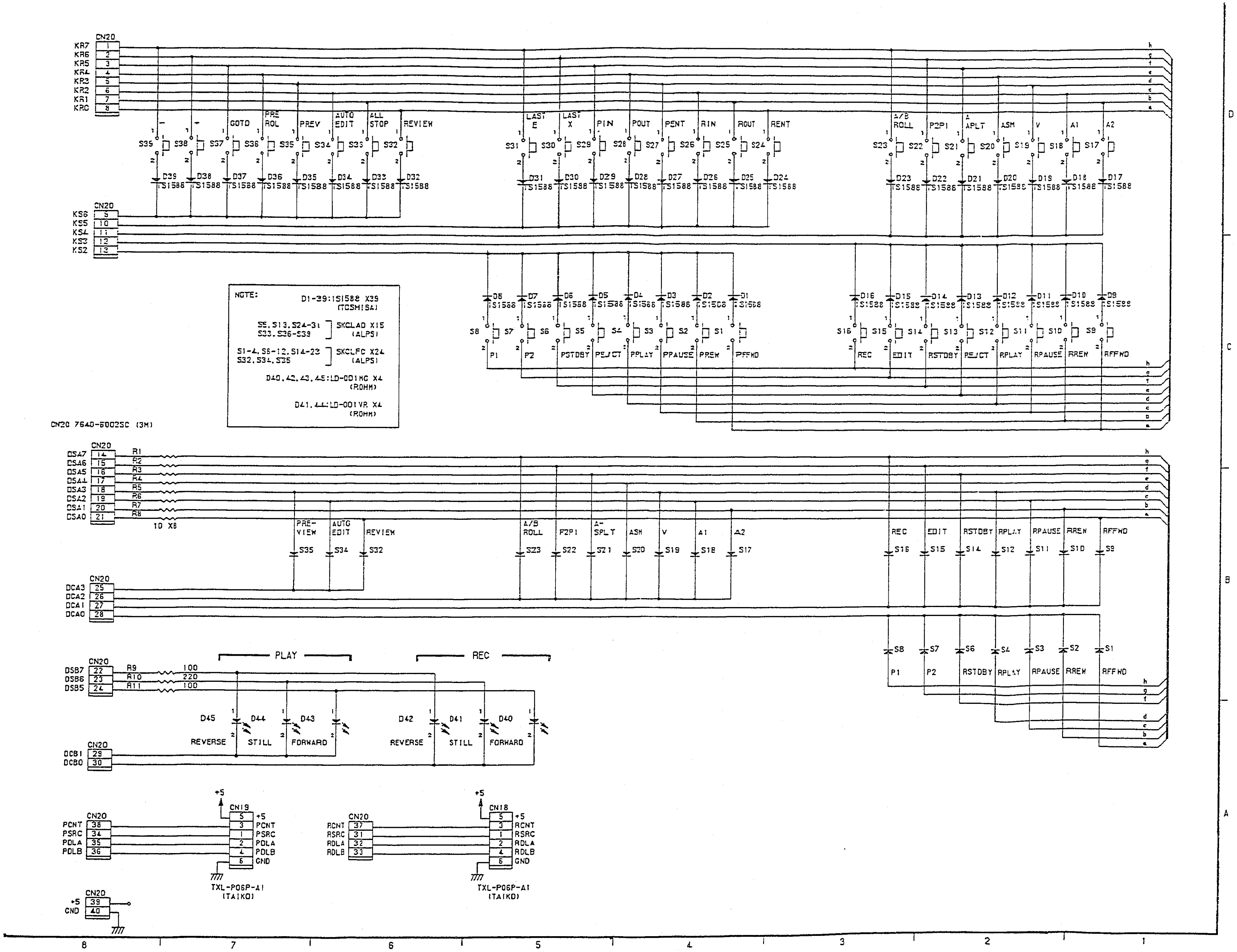
SCC(SYSTEM CONTROL CARD)SCHEMATIC DIAGRAM – 4


(1-1C)DB7
(1-1C)DB6
(1-1C)DB5
(1-1C)DB4
(1-1C)DB3
(1-1C)DB2
(1-1C)DB1
(1-1C)DB0
(1-1C)AB1
(1-1C)AB0
(1-1B)CW0
(1-1B)CW1
(1-1B)CR0
HC670
2E
4F
3E
3F
4D
3D
M54564P
1E
4E
M54583P
1D
HC139
2D
HC04
6E
+5
+12
CN16
DSA7
DSA6
DSA5
DSA4
DSA3
DSA2
DSA1
DSA0
DSB7
DSB6
DSB5
CN17
DSB3
DSB2
DSB1
DSB0
DCA3
DCA2
DCA1
DCA0
DDC2
DDC1
DDC0
DCB1
DCB0
SR3
SR2
SR1
SR0
RA1
10K
R4
R3
R2
R1
C1
C2
C3
C4
0.001
(3-1A) BD
(3-1A) S0
(3-1A) S1
(3-1A) S2
R55
1K
C19
0.001
D
C
B
A
8
7
6
5
4
3
2
1

SCC(SYSTEM CONTROL CARD)SCHEMATIC DIAGRAM – 5

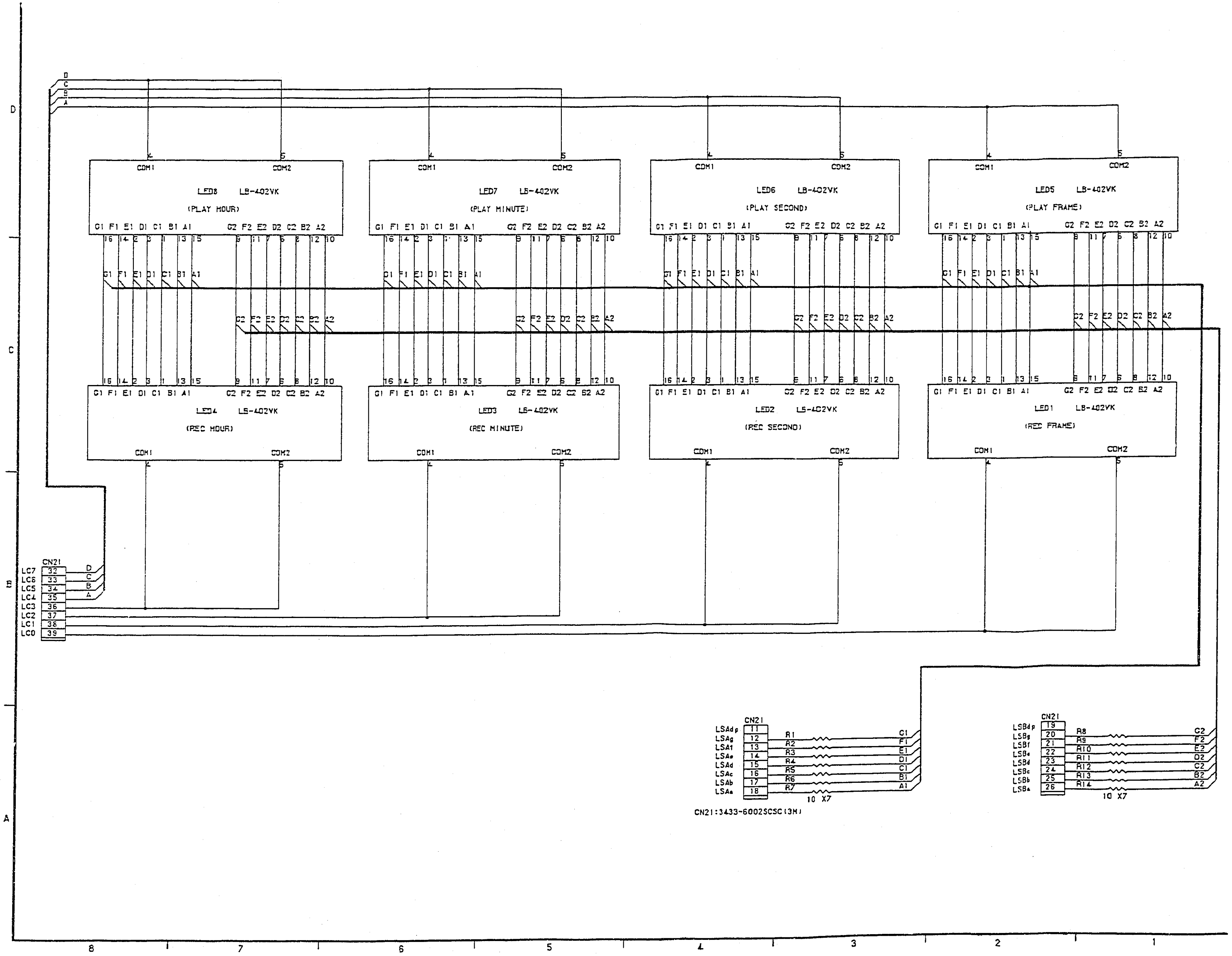

RSRC
CN16 31
R28 10K
R27 10K
C38 0.001
HC04 6E
RDLA
CN16 32
R26 10K
R25 10K
C37 0.001
RDLB
CN16 33
R24 10K
R23 10K
C36 0.001
PSRC
CN16 34
R22 10K
R21 10K
C35 0.001
PDLA
CN16 35
R20 10K
R19 10K
C34 0.001
PDLB
CN16 36
R18 10K
R17 10K
C33 0.001
RCNT
CN16 37
R16 10K
R15 10K
C32 0.001
PCNT
CN16 38
R14 10K
R13 10K
C31 0.001
HC04 6D
1S1588
D4 R38 22K
D3 R37 22K
D1 R34 22K
D2 R35 22K
HC123 7D
HC123 7C
C52 0.01
C53 0.01
C70 0.01
C71 0.01
C56 0.001
C55 0.001
R36 10K
R33 10K
CLR CX RX/CX 1A 1B 1Q 1Q̄
CLR CX RX/CX 2A 2B 2Q 2Q̄
RDLA(2-5C)
RDLB(2-5C)
PDLA(2-5C)
PDLB(2-5C)
RA9 10K
Z84C90PIO 10C
PA0 PA1 PA2 PA3 PA4 PA5 PA6 PA7
A RDY B RDY
A STB B STB
PB0 PB1 PB2 PB3 PB4 PB5 PB6 PB7
PC0 PC1 PC2 PC3 PC4 PC5 PC6 PC7
CXK1013P 8C
CE BOSY SCK DO DI GND OSC Vcc
ULN2003A 8D
1B 2B 3B 4B 5B 6B 7B 1C 2C 3C 4C 5C 6C 7C Vo
S1
SVS-DIP8SSCH (ALPS)
RA8 10K
Z84C90CTC 10C
1Vcc 2Vcc 3Vcc 4Vcc 5Vcc
TC/TO0 TC/TO0 TC/TO1 TC/TO2
CLK0 CLK1 CLK2 CLK3
(5-1A)FMP
(2-6D)RXRDY
(2-6D)TXRDY
(3-6C)KEYIP
R57 47
D7 1S1588
D8 1S1588
BZ SDC1610HS-01 (TDK)
D11 1S1588
D12 1S1588
G2E-187P-M RL1
CN11 CUE-REC M
CUE-REC C
D9 1S1588
D10 1S1588
G2E-187P-M RL2
CN11 CUE-X M
CUE-X C
CN16 39 +5
CN16 40 GND
REF VIDEO CN11 6
GND CN11 5
R48 75
C65 10/16
R49 33K
R46 22K
R47 1K
D5 1S1588
D6 1S1588
TR1 2SC1815
R45 1K
C64 0.0047
C61 0.1
LM1881 8E
SC FP VO CP
C59 0.1
R44 680K
FMP(5-4B)
+5
D
C
B
A
8 7 6 5 4 3 2 1

OPC(OPERATION PANEL CARD)SCHEMATIC DIAGRAM

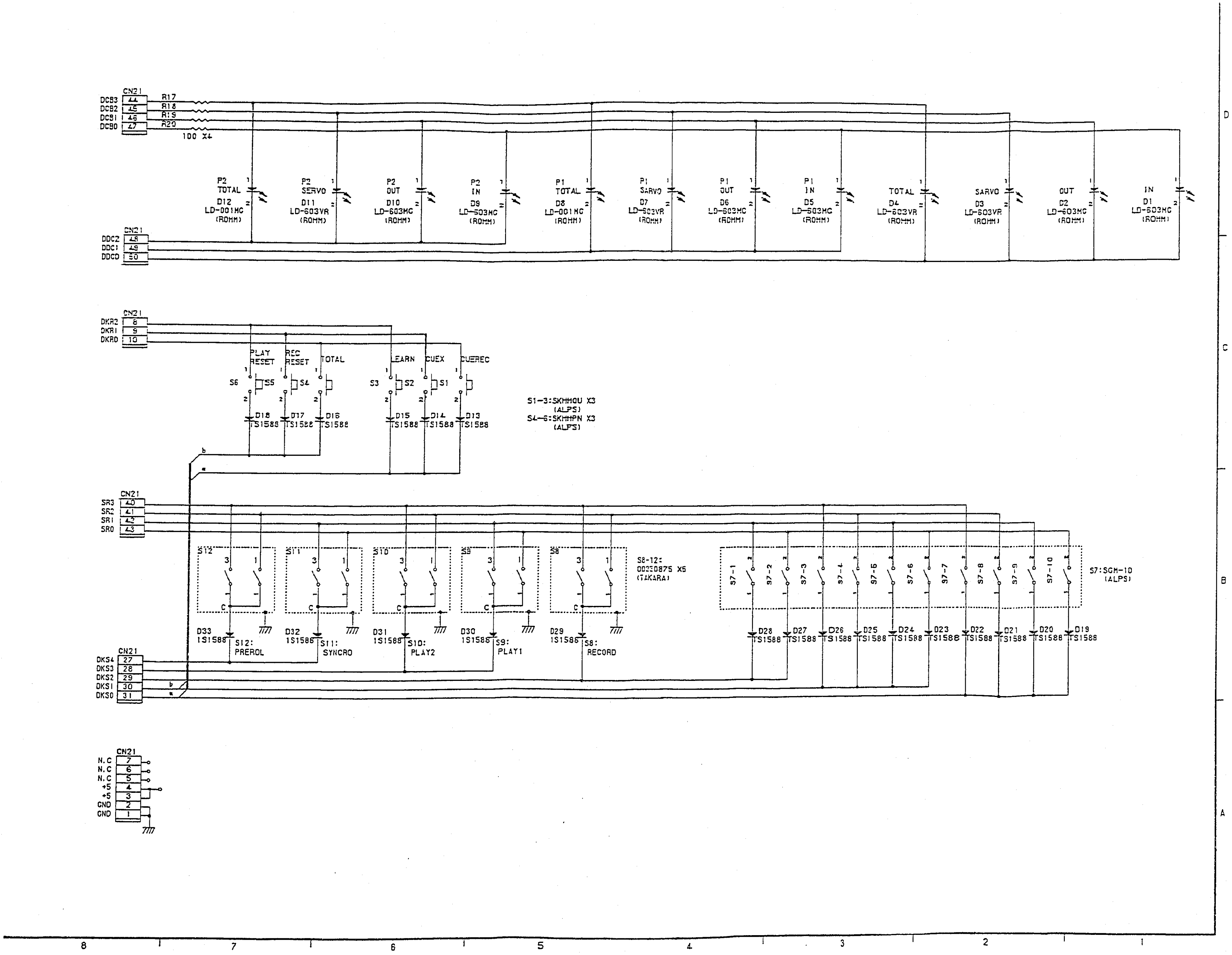

CN20
KR7
KR6
KR5
KR4
KR3
KR2
KR1
KR0
KS6
KS5
KS4
KS3
KS2
S39
S38
S37
S36
S35
S34
S33
S32
GOTO
PRE ROL
PREV
AUTO EDIT
ALL STOP
REVIEW
D39
D38
D37
D36
D35
D34
D33
D32
1S1588
LAST E
LAST X
PIN
POUT
PENT
RIN
ROUT
RENT
S31
S30
S29
S28
S27
S26
S25
S24
D31
D30
D29
D28
D27
D26
D25
D24
A/B ROLL
P2P1
APLT
ASM
V
A1
A2
S23
S22
S21
S20
S19
S18
S17
D23
D22
D21
D20
D19
D18
D17
D8
D7
D6
D5
D4
D3
D2
D1
S8
S7
S6
S5
S4
S3
S2
S1
P1
P2
PSTDBY
PEJCT
PPLAY
PPAUSE
PREW
PFFWD
D16
D15
D14
D13
D12
D11
D10
D9
S16
S15
S14
S13
S12
S11
S10
S9
REC
EDIT
RSTDBY
REJCT
RPLAY
RPAUSE
RREW
RFFWD
CN20 7640-6002SC (3M)
DSA7
DSA6
DSA5
DSA4
DSA3
DSA2
DSA1
DSA0
R1
R2
R3
R4
R5
R6
R7
R8
10 X8
PRE-VIEW
AUTO EDIT
REVIEW
A/B ROLL
P2P1
A-SPLT
ASM
V
A1
A2
DCA3
DCA2
DCA1
DCA0
PLAY
REC
DSB7
DSB6
DSB5
R9
R10
R11
100
220
100
D45
D44
D43
D42
D41
D40
REVERSE
STILL
FORWARD
DCB1
DCB0
+5
CN19
CN18
PCNT
PSRC
PDLA
PDLB
GND
RCNT
RSRC
RDLA
RDLB
TXL-P06P-A1
(TAIKO)
h
g
f
e
d
c
b
a
D
C
B
A
8
7
6
5
4
3
2
1

NOTE:
D1-39:1S1588 X39 (TOSHISA)
S5, S13, S24-31, S33, S36-S39] SKCLAD X15 (ALPS)
S1-4, S6-12, S14-23, S32, S34, S35] SKCLFC X24 (ALPS)
D40, 42, 43, 45:LD-001MG X4 (ROHM)
D41, 44:LD-001VR X4 (ROHM)

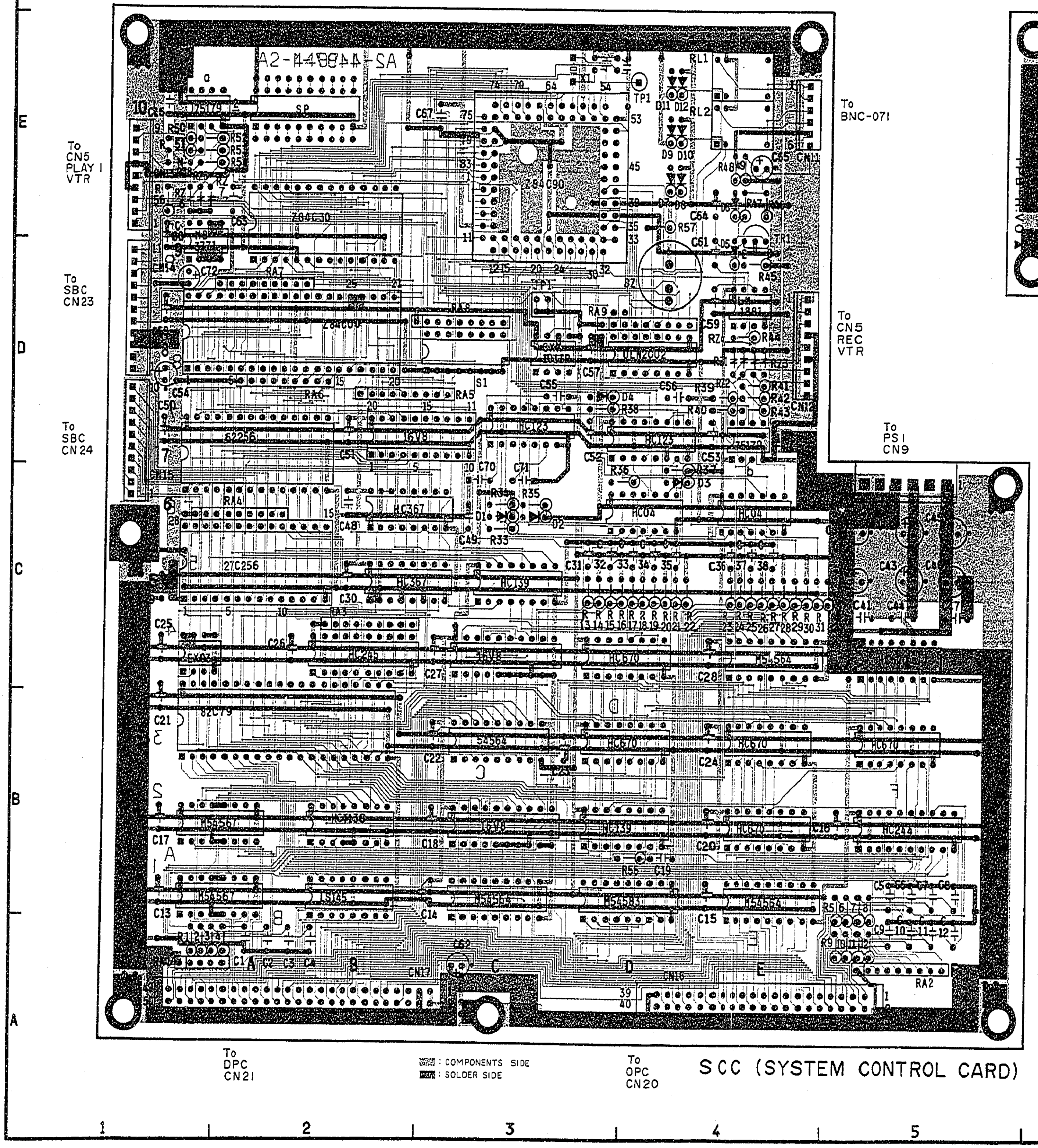
DPC(DISPLAY PANEL CARD)SCHEMATIC DIAGRAM – 1


D
C
B
A
COM1
COM2
LED8 LB-402VK
(PLAY HOUR)
LED7 LB-402VK
(PLAY MINUTE)
LED6 LB-402VK
(PLAY SECOND)
LED5 LB-402VK
(PLAY FRAME)
G1 F1 E1 D1 C1 B1 A1
G2 F2 E2 D2 C2 B2 A2
16 14 2 3 1 13 15
9 11 7 6 8 12 10
LED4 LB-402VK
(REC HOUR)
LED3 LB-402VK
(REC MINUTE)
LED2 LB-402VK
(REC SECOND)
LED1 LB-402VK
(REC FRAME)
CN21
LC7 32
LC6 33
LC5 34
LC4 35
LC3 36
LC2 37
LC1 38
LC0 39
LSAdp 11
LSAg 12
LSAf 13
LSAe 14
LSAd 15
LSAc 16
LSAb 17
LSAa 18
R1
R2
R3
R4
R5
R6
R7
10 X7
LSBdp 19
LSBg 20
LSBf 21
LSBe 22
LSBd 23
LSBc 24
LSBb 25
LSBa 26
R8
R9
R10
R11
R12
R13
R14
10 X7
CN21:3433-6002SCSC(3M)
8
7
6
5
4
3
2
1

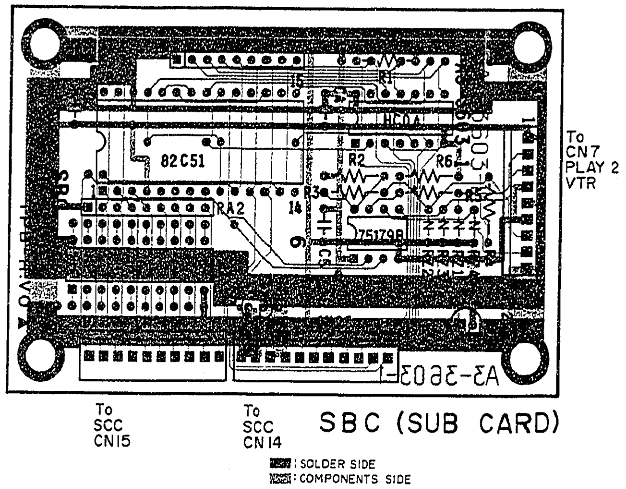
DPC(DISPLAY PANEL CARD)SCHEMATIC DIAGRAM – 2


CN21
DCB3 44
DCB2 45
DCB1 46
DCB0 47
R17
R18
R19
R20
100 X4
P2 TOTAL D12 LD-001MC (ROHM)
P2 SERVO D11 LD-603VR (ROHM)
P2 OUT D10 LD-603MC (ROHM)
P2 IN D9 LD-503MC (ROHM)
P1 TOTAL D8 LD-001MC (ROHM)
P1 SARVO D7 LD-503VR (ROHM)
P1 OUT D6 LD-603MC (ROHM)
P1 IN D5 LD-503MC (ROHM)
TOTAL D4 LD-603VR (ROHM)
SARVO D3 LD-603VR (ROHM)
OUT D2 LD-603MC (ROHM)
IN D1 LD-503MC (ROHM)
CN21
DDC2 48
DDC1 49
DDC0 50
CN21
DKR2 8
DKR1 9
DKR0 10
PLAY RESET
REC RESET
TOTAL
LEARN
CUEX
CUEREC
S6
S5
S4
S3
S2
S1
D18 TS1588
D17 TS1588
D16 TS1588
D15 TS1588
D14 TS1588
D13 TS1588
S1–3:SKHHOU X3 (ALPS)
S4–6:SKHHPN X3 (ALPS)
b
a
CN21
SR3 40
SR2 41
SR1 42
SR0 43
S12
S11
S10
S9
S8
3
1
C
D33 1S1588 S12: PREROL
D32 1S1588 S11: SYNCRO
D31 1S1588 S10: PLAY2
D30 1S1588 S9: PLAY1
D29 1S1588 S8: RECORD
S8-12: 00230875 X5 (TAKARA)
S7-1
S7-2
S7-3
S7-4
S7-5
S7-6
S7-7
S7-8
S7-9
S7-10
S7:SGM-10 (ALPS)
D28 TS1588
D27 TS1588
D26 TS1588
D25 TS1588
D24 TS1588
D23 TS1588
D22 TS1588
D21 TS1588
D20 TS1588
D19 TS1588
CN21
DKS4 27
DKS3 28
DKS2 29
DKS1 30
DKS0 31
CN21
N.C 7
N.C 6
N.C 5
+5 4
+5 3
GND 2
GND 1
D
C
B
A
8
7
6
5
4
3
2
1

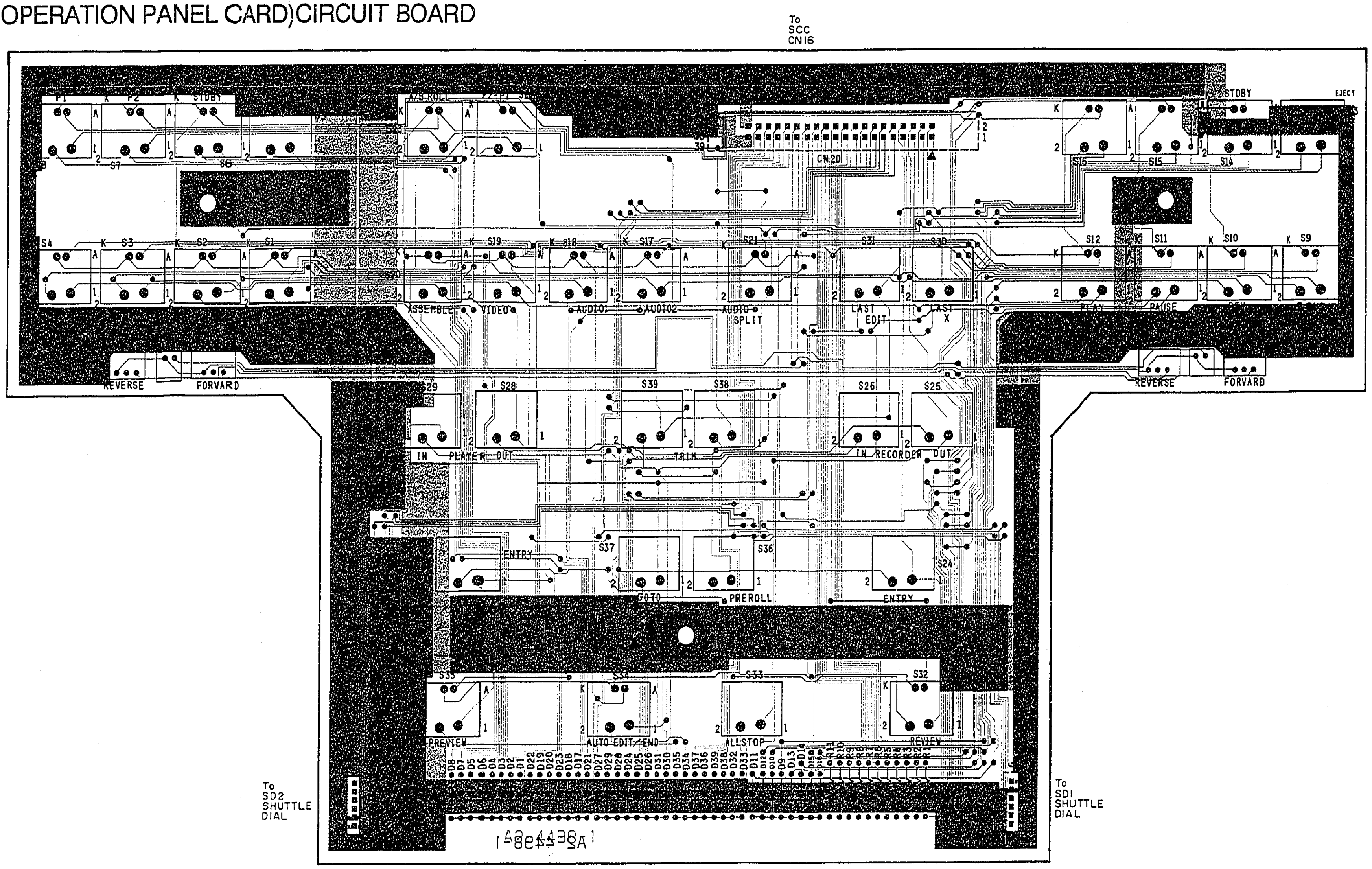
SCC(SYSTEM CONTROL CARD)CIRCUIT BOARD


A2-4408A4-SA
To
CN5
PLAY 1
VTR
To
SBC
CN23
To
SBC
CN24
To
BNC-071
To
CN5
REC
VTR
To
PS1
CN9
To
DPC
CN21
To
OPC
CN20
▨ : COMPONENTS SIDE
■ : SOLDER SIDE
SCC (SYSTEM CONTROL CARD)
Z84C90
Z84C30
Z84C00
62256
27C256
82C79
UCN2002
HC123
HC367
HC139
HC04
HC245
HC670
HC138
HC244
16V8
54564
M54567
LS145
M54583
M54564
75179
CN15
CN17
CN18
CN11
CN12
RA1
RA2
RA4
RA5
RA6
RA7
RA8
RA9
TP1
RL1
RL2
SP
S1
BZ
E
D
C
B
A
1
2
3
4
5
6
7
8

SBC(SUB CARD)CIRCUIT BOARD


A3-3603-1
HC04
82C51
75179B
RA2
R1
R2
R6
To
CN7
PLAY 2
VTR
To
SCC
CN15
To
SCC
CN14
SBC (SUB CARD)
■ : SOLDER SIDE
▨ : COMPONENTS SIDE

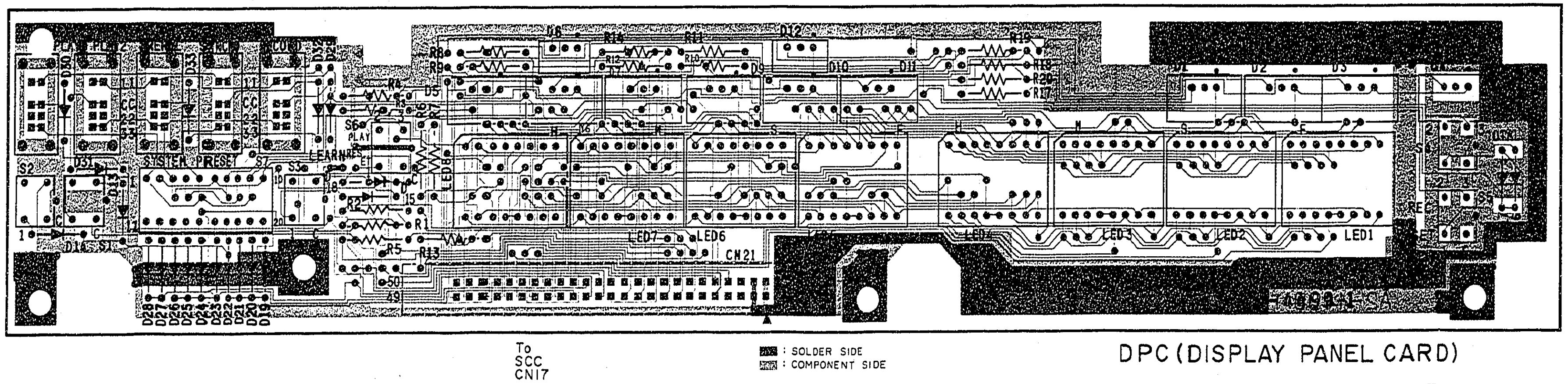
OPC(OPERATION PANEL CARD)CIRCUIT BOARD


To
SCC
CN16
P1
P2
STDBY
A/B ROLL
CN20
STDBY
EJECT
S6
S7
S8
S16
S15
S14
S4
S3
S2
S1
S19
S18
S17
S21
S31
S30
S12
S11
S10
S9
ASSEMBLE
VIDEO
AUDIO1
AUDIO2
AUDIO SPLIT
LAST EDIT
LAST X
PLAY
PAUSE
REVERSE
FORVARD
REVERSE
FORVARD
S29
S28
S39
S38
S26
S25
IN PLAYER OUT
TRIM
IN RECORDER OUT
ENTRY
S37
S36
S24
GOTO
PREROLL
ENTRY
S35
S34
S33
S32
PREVIEW
AUTO EDIT/END
ALLSTOP
REVIEW
To
SD2
SHUTTLE
DIAL
To
SD1
SHUTTLE
DIAL

▨ : COMPONENTS SIDE
■ : SOLDER SIDE

O P C (OPERATION PANEL CARD)

DPC(DISPLAY PANEL CARD)CIRCUIT BOARD


PLAY
LEARNING
SYSTEM PRESET
LED1
LED2
LED3
LED4
LED5
LED6
LED7
CN21
To
SCC
CN17
E
D
C
B
A
1
2
3
4
5
6
7
8

■ : SOLDER SIDE
▨ : COMPONENT SIDE

D P C (DISPLAY PANEL CARD)

VL-EC10/20 OPERATION THEORY

1. OVERVIEW

The VL-EC10/20 is an editing controller which performs high-precision editing together with the VL-S100/VL-S110 VTRs for commercial use.
The VL-EC10 is basically for the remote control of a playback VTR (P1) and recording VTR (REC) through a 9-pin interface.
In addition to the VL-EC10's functions, the VL-EC20 controls another playback VTR (P2) in parallel and is suitable for A/B roll editing.

NOTE: circuit numbers of each ic correspond to coordinates on circuit boards.

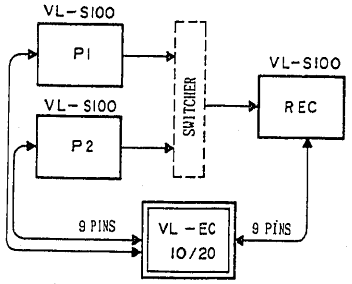

VL-S100
P1
VL-S100
P2
SWITCHER
VL-S100
REC
9 PINS
VL-EC 10/20
9 PINS

Fig1.

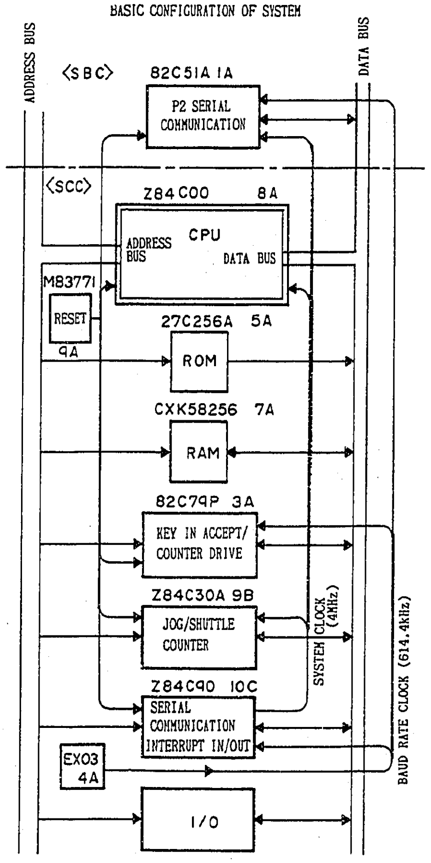
2. MAJOR OPERATIONS OF SYSTEM

1. Controls a variety types of editing (insert, assemble).
2. Accepts key inputs.
3. Displays player and recorder address counters.
4. Communicates with VTRs serially.
5. Processes various types of interrupts.
6. Displays functions.
7. Processes system initialization.
8. Input/output interface
9. Jog/shuttle controls
10. P2 serial communications

3. SYSTEM OPERATION

Fig. 2 shows the basic configuration and the block diagram shows the details. The CPU 8A: Z84C00 controls the data bus and address bus for overall control of the system.
The CPU communicates with IC3A: Z82C79P for key inputs, with IC10C: Z84C90 for serial communications with the VTR, and with IC9B: Z84C30A for jog/shuttle control. Through these communications, the VL-EC10/20 performs edit operations such as the setting of edit IN and OUT points, controlling the playback and recording VTRs.

BASIC CONFIGURATION OF SYSTEM


ADDRESS BUS
DATA BUS
<SBC>
82C51A 1A
P2 SERIAL COMMUNICATION
<SCC>
Z84C00 8A
CPU
ADDRESS BUS
DATA BUS
MB3771
RESET
9A
27C256A 5A
ROM
CXK58256 7A
RAM
82C79P 3A
KEY IN ACCEPT/ COUNTER DRIVE
Z84C30A 9B
JOG/SHUTTLE COUNTER
SYSTEM CLOCK (4MHz)
Z84C90 10C
SERIAL COMMUNICATION INTERRUPT IN/OUT
EX03 4A
BAUD RATE CLOCK (614.4kHz)
I/O

3-1. SYSTEM RESET

IC9A: MB3771 generates reset pulses for the whole system and initializes all processors at the same time. The reset signal is output when Vcc is less than about 4.3V.

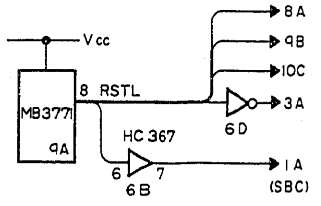

Vcc
MB3771
9A
8 RSTL
HC 367
6
7
6B
6D
8A
9B
10C
3A
1A
(SBC)

Fig. 2A

3-2. System clock (for baud rate)

Module EX03: 4A is a clock generator which divides the 19.660MHz original signal to generate a 614.4kHz signal. This module operates as a baud rate generator for serial communications.

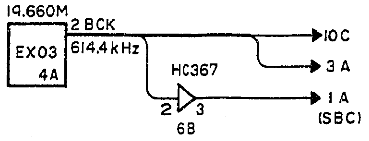

19.660M
2 8CK
EX03
4A
614.4kHz
HC367
2
3
6B
10C
3A
1A
(SBC)

Fig. 2B

3-3. Syetem clock (for whole system)

The IC10C divides a 8MHz oscillation signal to obtain a 4MHz signal which is used as an operation clock signal for the system.

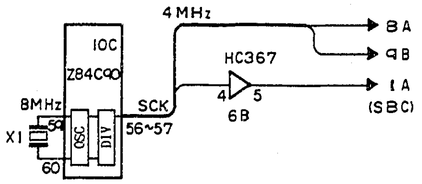
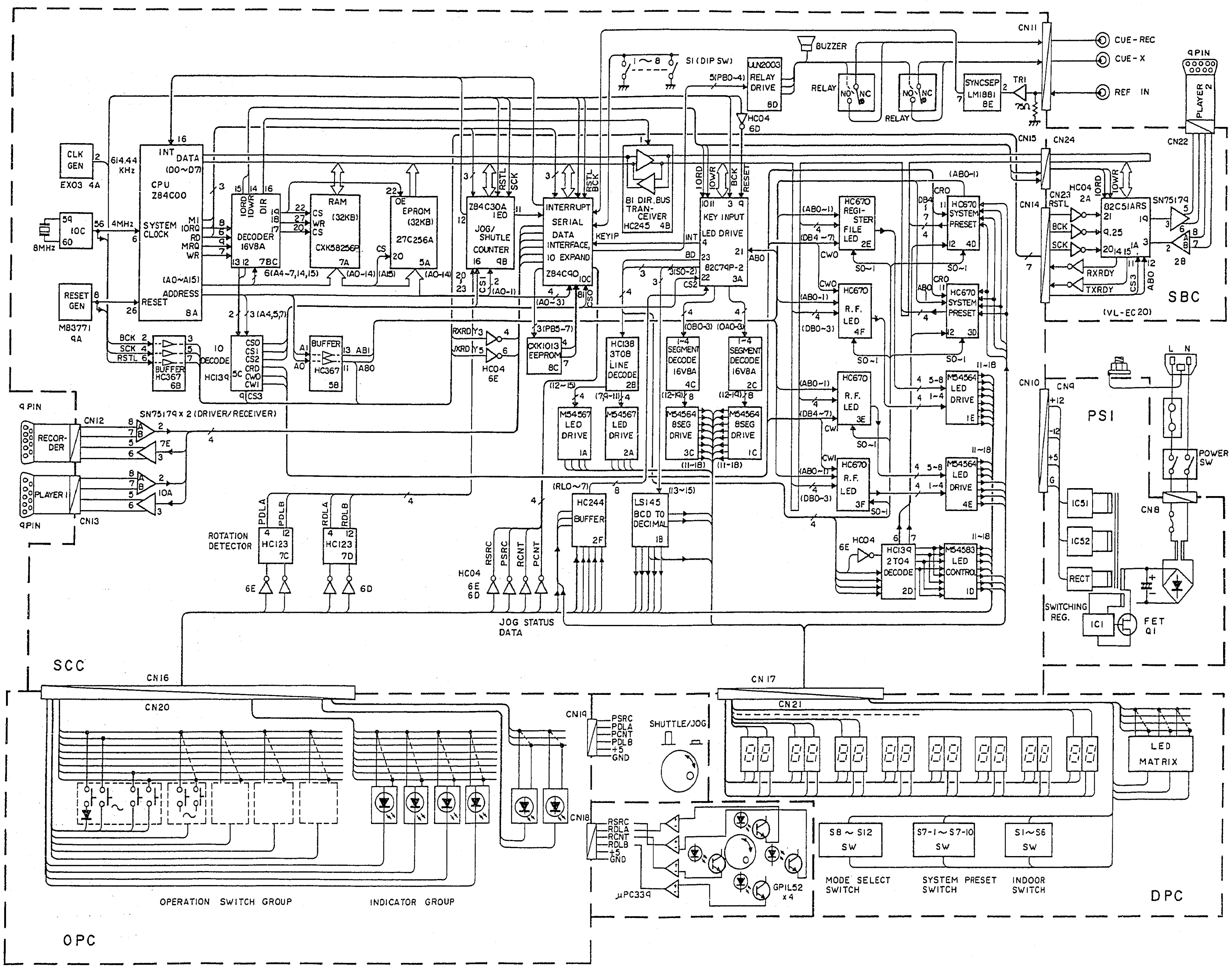

4MHz
10C
Z84C90
8MHz
X1
59
60
OSC
DIV
SCK
56~57
HC367
4
5
6B
8A
9B
1A
(SBC)

Fig. 2C

OVERALL BLOCK DIAGRAM


CLK GEN
EXO3 4A
614.44 KHz
CPU Z84C00
SYSTEM CLOCK
8MHz
RESET GEN
M83771 9A
DECODER 16V8A 7BC
RAM (32KB) CXK58256P 7A
EPROM (32KB) 27C256A 5A
Z84C30A 1E0 JOG/SHUTLE COUNTER 9B
INTERRUPT SERIAL DATA INTERFACE, IO EXPAND Z84C90 10C
81 DIR. BUS TRANCEIVER HC245 4B
KEY INPUT LED DRIVE 82C79P-2 3A
S1 (DIP SW)
UDN2003 RELAY DRIVE 8D
BUZZER
RELAY
SYNCSEP LM1881 8E
TR1
CN11
CUE-REC
CUE-X
REF IN
9PIN
PLAYER 2
CN15
CN24
CN22
CN14
82C51ARS 9.25
SN75179
RXRDY
TXRDY
SBC
(VL-EC20)
HC670 SYSTEM PRESET 4D
HC670 REGISTER FILE LED 2E
HC670 R.F. LED 4F
HC670 SYSTEM PRESET 3D
HC670 R.F. LED 3E
HC670 R.F. LED 3F
M54564 LED DRIVE 1E
M54564 LED DRIVE 4E
M54583 LED CONTROL 1D
HC139 2TO4 DECODE 2D
BUFFER HC367 6B
IO DECODE HC139 5C
BUFFER HC367 5B
CXK1013 EEPROM 8C
HC04 6E
HC138 3TO8 LINE DECODE 2B
SEGMENT DECODE 16V8A 4C
SEGMENT DECODE 16V8A 2C
M54567 LED DRIVE 1A
M54567 LED DRIVE 2A
M54564 8SEG DRIVE 3C
M54564 8SEG DRIVE 1C
HC244 BUFFER 2F
LS145 BCD TO DECIMAL 1B
SN75179×2 (DRIVER/RECEIVER)
RECORDER
PLAYER 1
CN12
CN13
7E
10A
ROTATION DETECTOR
HC123 7C
HC123 7D
PDLA PDLB RDLA RDLB
RSRC PSRC RCNT PCNT
JOG STATUS DATA
SCC
CN10
CN9
PS1
IC51
IC52
RECT
SWITCHING REG.
IC1
FET Q1
CN8
POWER SW
L N
CN16
CN20
CN19
CN17
CN21
SHUTTLE/JOG
CN18
μPC339
GPIL52 ×4
LED MATRIX
S8~S12 SW
S7-1~S7-10 SW
S1~S6 SW
MODE SELECT SWITCH
SYSTEM PRESET SWITCH
INDOOR SWITCH
OPERATION SWITCH GROUP
INDICATOR GROUP
OPC
DPC

4. 82C 79P-2 PROGRAMMABLE KEYBOARD/ DISPLAY INTERFACE FUNCTIONS

4-1. Acceptance of operation key inputs

Operation button inputs are accepted through key scanning by interface element IC3A (82C79P -2). IC3A outputs 3-bit BCD codes to SO (pin 32) - S2 (pin 34) with a period of approx. 5 ms and supplies them IC1B (LS145). Scanning is performed by a matrix circuit consisting of 8 lines input to RLO - RL7 of IC3A through IC2F (HC244) which receives data, synchronized with 5 lines consisting of KS2 (pin 3)-KS6 (pin 7) of the 8 lines decoded by IC1B. In this way, IC3A receives 40 operation key inputs.

Commands and data are transferred between IC3A and the CPU through bidirectional data buses DBO - DB7.

When a key input is given, IC3A generates an interrupt request signal at pin 4 and supplies it to the CPU through IC10C.

Data is read and written by setting the RD and WR signals to "low".

CS (pin 22) is set to "low" to select the chip.

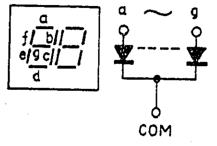
AO (pin 21) is a command/data control input; "high"is interpreted as a command or status and "low", as data.

4-2. 7-segment digit counter display drive

The counters of the recording and playback VTRs use 8 7-segment digits and display the hours, minutes, seconds and frames (2 digits each).

4 bits AO-A3/BO-B4 each output from IC3A (82C79P) are decoded by 2C/4C (16V8) to drive the 7 segments through 8 lines of segment drivers IC1C/3C (M54564). Digits are scanned by decoding 3 bits SO-S2 at IC2B (HC138) and controlling the common terminals of each digit through drivers IC1A/2A (M54567), thus lighting the display dynamically.

The display is blanked by the BD output (pin 23) when a digit is switched or when a blanking command is given. The 16V8A includes program logic and can be erased and written electrically. The same logic is written to the ICs 2C/4C and a different logic is written to 7BC.


a
f
b
e
g
c
d
a ~ g
COM

LED DIGITS

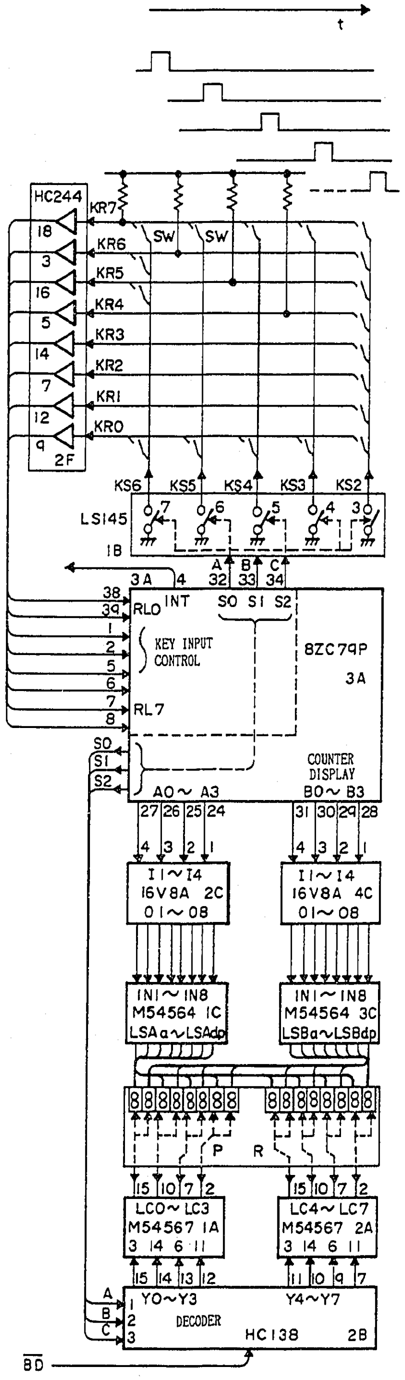

t
HC244
18
3
16
5
14
7
12
9
2F
KR7
KR6
KR5
KR4
KR3
KR2
KR1
KR0
SW
SW
KS6
KS5
KS4
KS3
KS2
LS145
1B
A
B
C
3A
4
32
33
34
38
39
RLO
INT
SO S1 S2
KEY INPUT CONTROL
8ZC79P
3A
RL7
SO
S1
S2
COUNTER DISPLAY
AO~ A3
BO~ B3
27 26 25 24
31 30 29 28
I1~I4
16V8A 2C
O1~O8
I1~I4
16V8A 4C
O1~O8
IN1~IN8
M54564 1C
LSAa~LSAdp
IN1~IN8
M54564 3C
LSBa~LSBdp
P
R
15 10 7 2
LC0~LC3
M54567 1A
3 14 6 11
LC4~LC7
M54567 2A
15 14 13 12
11 10 9 7
Y0~Y3
Y4~Y7
A
B
C
DECODER
HC138
2B
BD

Fig. 3

5. Z84C90 MULTI-I/O

5-1. Serial communication interface

Communications with external equipment (VTRs such as the VL-S100) are controlled via a 9 -pin interface compatible with RS-422A. Since a RS-422A interface uses a dual communication line to relay data, data is relayed by driver/ receiver 7E/10A (SN75179) and is then input to Z84C90 10C.

The VL-EC20 can control two playback VTRs serially to perform A/B roll editing, etc. Serial data is used for communications. This is converted to parallel data by 10C and is processed by commands from the CPU (8A) through the data bus and address bus.

The serial data of 2 channels P1 and REC is processed by 10C and the serial data of P2 is processed by 1A (82C51A).

5-2. Interrupt processing requests

Interrupt signals which request the CPU for the following processes are generated.

A: Frame pulse (10C-72)

B: Communications with P2 (10C-73, 74)

C: Key inputs (10C-75)

The frame pulse is obtained by IC8E (LM1881) which separates sync from the external reference signal input via REF IN. This pulse provides the reference timing for processing.

5-3. Input/output interface

Z84C90 has 3 groups (A-C) of parallel input/ output ports.

A ports (PAO-PA7):

These ports input the data from the EEPROM (CXK1013:8C) and the status of the jog dial.

CXK1013 is an E^2PROM consisting of 256 words x 8 bits which is erased and programmed electrically. Data is serially input/output and erased or written automatically. It stores the start parameters, etc. of the VTRs in the LEARN operation.

B ports (PBO-PB7):

These ports output data to EEPROM: 8C and control the buzzer, CUE-X and CUE-REC through relay driver ULN2003A.

C ports (PCO-PC7):

These input the statuses of DIP switches (S1).

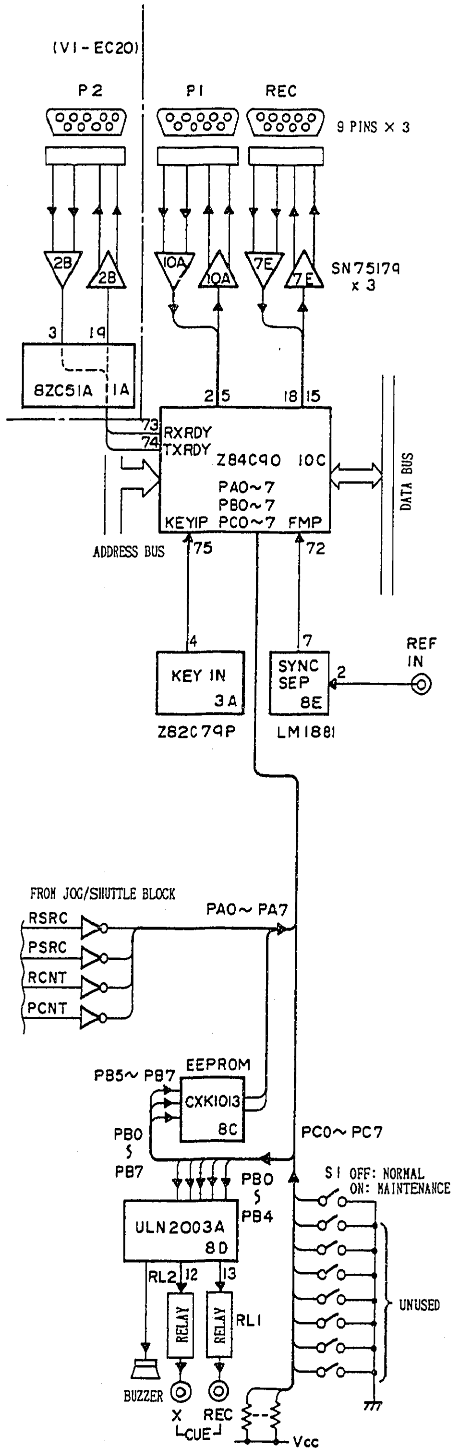

(VI-EC20)
P2
P1
REC
9 PINS × 3
2B
2B
10A
10A
7E
7E
SN75179 × 3
3
19
8ZC51A
1A
2
5
18
15
73
74
RXRDY
TXRDY
Z84C90 10C
PA0~7
PB0~7
KEYIP
PC0~7
FMP
DATA BUS
ADDRESS BUS
75
72
4
KEY IN
3A
Z82C79P
7
SYNC SEP
8E
2
LM1881
REF IN
FROM JOG/SHUTTLE BLOCK
RSRC
PSRC
RCNT
PCNT
PA0~ PA7
PB5~ PB7
EEPROM
CXK1013
8C
PB0
PB7
PC0~ PC7
PB0
PB4
S1 OFF: NORMAL
ON: MAINTENANCE
ULN2003A
8D
RL2
12
13
RELAY
RELAY
RL1
UNUSED
BUZZER
X
REC
CUE
Vcc

Fig. 4

6. FUNCTION LED INDICATIONS

The CPU (8A) designates the data and address and then writes the indication commands to register files 2E, 4F, 3E and 3F (HC670) via CWO-1. The commands are read by 2-bit instructions SO and S1 from 3A and are output from buffer ICs 1E and 4E (M54564); SO and S1 are decoded by IC 2D (HC139). The decoded signals control the LED control IC 1D (M54583) and perform scanning in sequence, thus causing the corresponding function LED to light dynamically in a matrix.
The data bus is driven by bidirectional bus line buffer IC4B (HC245) and A0 and A1 in the address bus are driven by buffer IC5B (HC367). HC670 is a register which stores 4 words (1 word: 4 bits) and each word is selected by 2 bits WA and WB during writing and by 2 bits RA and RB during reading. Writing and reading can be done simultaneously. When CR and CW are "low", data is written or read.

7. SYSTEM PRESET INPUT

CPU 8A and processor 3A control the system preset and mode inputs via the data bus and address bus by writing and reading the setting status to/from 3D and 4D (HC670). The 3-bit outputs SO-S2 from 3A are decoded by 1B (LS145) and the obtained 5 lines scan the system preset switch and mode select switch groups, and the setting status is read in 3D and 4D by the writing commands obtained by IC2D (HC139) which decodes 2 bits BO and S2.
At the rising edge of BD input to the decoder IC 2D, "LOW" of S2 sets IC 4D and "HIGH" sets IC 3D respectively to writing enable. When S2 is "LOW", DKSO~DKS3 are scanned by SO and S1 and the matrix data (SRO~SR3×DKSO~DKS3) are written into IC 4D.
SO is the matrix data (SRO~SR3×DKS4) to IC 3D for "HIGH".
<Selection of file registers 2E,4F, 3E, 3F, 3D, 4D> IC 7BC(16V8A) decodes IORQ, RD, WR and address commands from CPU. IC 5C(HC139) interprets it and generates the writing commands (CWO~CW1) for 2E, 4F, 3E, 3F or the reading one (CRO) for 3D, 4D to select file registers.

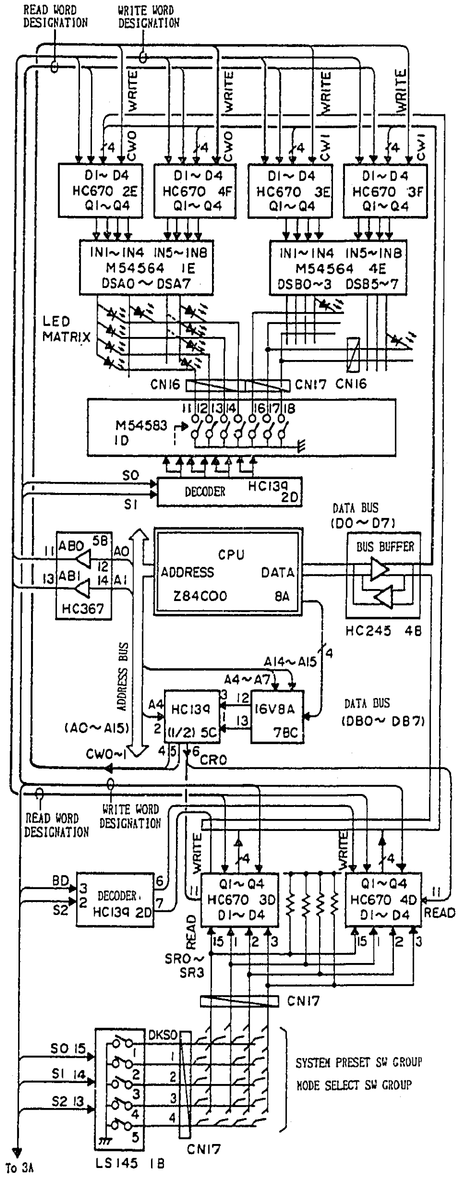

READ WORD DESIGNATION
WRITE WORD DESIGNATION
WRITE
CWO
CW1
DI~D4 HC670 2E QI~Q4
DI~D4 HC670 4F QI~Q4
DI~D4 HC670 3E QI~Q4
DI~D4 HC670 3F QI~Q4
INI~IN4 IN5~IN8 M54564 1E DSA0~DSA7
INI~IN4 IN5~IN8 M54564 4E DSB0~3 DSB5~7
LED MATRIX
CN16
CN17
M54583 1D
SO
SI
DECODER HC139 2D
DATA BUS (D0~D7)
BUS BUFFER
HC245 4B
AB0
AB1
HC367
5B
A0
A1
CPU
ADDRESS
DATA
Z84C00
8A
ADDRESS BUS
(A0~A15)
A14~A15
A4~A7
HC139 (1/2) 5C
16V8A 7BC
DATA BUS (DB0~DB7)
CWO~1
CRO
BD
S2
DECODER HC139 2D
QI~Q4 HC670 3D DI~D4
QI~Q4 HC670 4D DI~D4
READ
SRO~SR3
DKSO
SO
SI
S2
SYSTEM PRESET SW GROUP
MODE SELECT SW GROUP
LS145 1B
To 3A

Fig. 5

8. P2 SERIAL COMMUNICATIONS (OPTIONAL FOR THE VL-EC10)

The VL-EC20 communicates with a VTR (P2) serially via IC 1A:82C51A on the SBC circuit board.

82C51A receives parallel data from CPU Z84C00 via data bus D0-D7 and converts it to serial data to send it, and also receives serial data from a VTR, etc. and converts it to parallel data to send it to the CPU.

82C51A is compatible with 8251A manufactured by Intel Corp.

The baud rate is specified as 38.4K in the RS422A specifications and is produced by dividing the 614.4kHz BCK (baud rate clock) pulse input to pins 9 and 25 by 16. 82C51A outputs RXRDY at pin 14 after completing reception and TXRDY at pin 15 after completing the ready for transmission and applies INTERRUPT to the CPU through 10C and transfers data as a interruption process.

Since RS422A performs transmission and reception via the dual communication line, the serial data output from 82C51A is converted to two lines by differential line driver/receiver IC 2B (SN75179) and is transmitted. The reception data from pin 9 is also transferred on two lines, so it is converted to one line and is transferred to 82C51A.

· SN75179 FUNCTIONAL TABLE TABLE 2

(Driver section) (Receiver section)

Input	Output	
D	Y	Z
H	H	L
L	L	H

Differential input	Output
A - B	R
VID ≧ 0.2V	H
-0.2 < VID < 0.2	indefinite
VID ≦ -0.2V	L

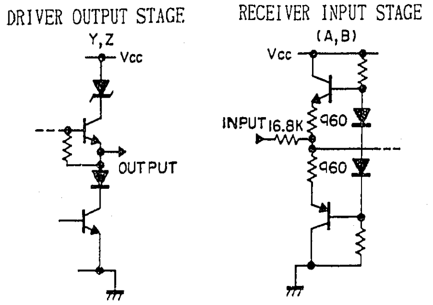

DRIVER OUTPUT STAGE
Y,Z
Vcc
OUTPUT
RECEIVER INPUT STAGE
(A,B)
Vcc
INPUT
16.8K
960
960

Fig. 6

TABLE 1

$\overline{CS}$	C/$\overline{D}$	$\overline{RD}$	$\overline{WR}$	
1	X	X	X	3-data data bus
0	X	1	1	3-data data bus
0	1	0	1	Status to CPU
0	1	1	0	Control Word from CPU
0	0	0	1	Data to CPU
0	0	1	0	Data from CPU

CS: Active "low" input terminal. Device select
C/D: Data or command word, status word select
(ABO) Low: Accesses the data to be transferred.
High: Accesses the command word, status word.
RD: Active "low" input terminal. Reads
(IORD) reception data, status word.
WR: Active "low" input terminal. Writes
(IOWR) transmission data, control word.

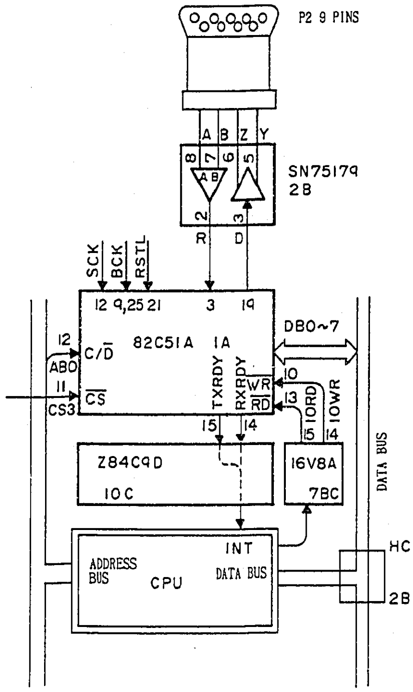

P2 9 PINS
A B Z Y
8 7 6 5
SN75179
2B
2 3
R D
SCK
BCK
RSTL
12 9,25 21 3 19
82C51A 1A
C/D
CS
12
ABO
11
CS3
TXRDY
RXRDY
WR
RD
10
13
15 14
DB0~7
IORD
IOWR
5 14
Z84C90
10C
16V8A
7BC
INT
ADDRESS BUS
CPU
DATA BUS
HC245
2B

Fig. 7

9. JOG/SHUTTLE CONTROL

9-1. Jog/shuttle interface

4-bit data is sent from the jog/shuttle dial. These 4 bits are used to discriminate between the jog and shuttle modes (RSRC), and detect center position in the shuttle mode (RCNT) and rotation information (RDLA', RDLB') from the direction and speed of rotation. The rotation information is detected as shown in the diagram on the below in which the photodiodes and phototransistors detect the cyclical change in the amount of light caused by the rotary encoder. There are 27 slits in one rotation and the frequency increases or decreses according to the speed at which the dial is turned.The center position is detected and dicrimination between the jog and shuttle modes is performed by shading the light structurally. The rotation information is obtained by arranging two pairs of photodiodes and phototransistors so that the phase difference is approx. 90° .

JOG/SHUTTLE ROTARY ENCODER

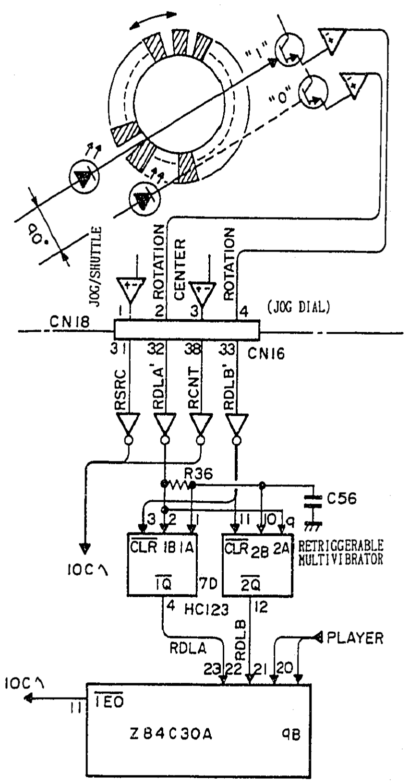

"1"
"0"
90°
JOG/SHUTTLE
ROTATION
CENTER
ROTATION
(JOG DIAL)
CN18
1 2 3 4
31 32 38 33
CN16
RSRC
RDLA'
RCNT
RDLB'
R36
C56
3 2 1
11 10 9
CLR 1B 1A
CLR 2B 2A
1Q
2Q
7D
RETRIGGERABLE MULTIVIBRATOR
4 HC123 12
10C
RDLA
RDLB
PLAYER
23 22 21 20
10C
11
IEO
Z84C30A
9B

Fig. 8

9-2. Interrupts

Z84C30A (9B) and Z84C90 (10C) form a daisy chain and 9B has priority supplying interrupts to the CPU. Pin 11 (IEO) of 9B is a interrupt enable output which limits interrupts by 10C to a lower rank.

9-3. Dial pulse generator

ICs 7C and 7D (HC123) convert two signals with different phases which correspond to the direction of rotation of the dial and the distance moved, to a pulse row according to the direction of rotation; 7C is for the playback VTR and 7D is for the recording VTR. RDLA' and RDLB' are supplied from the jog/shuttle dial. The RDLB' pulse which is used as the reset signal has a phase +90° (-90°) different from the RDLA' pulse when the dial is turned clockwise (counterclockwise), as shown in the figure on the below. On the other hand, the RDLA' signal is inverted and supplied to the two retriggerable multivibrators in 7D as the B input (7D-2) and A input (7D-9), and at the same time, the RDLA' signal is delayed by C56 and R36 and is supplied to the A input (7D-1) and B input (7D -10). Since triggering is not applied while the reset pulse (RDLB') is "low", row of RDLA pulses (7D-4) is obtained when the dial is turned clockwise and row of RDLB pulses (7D-12) is obtained when the dial is turned counterclockwise, as can be seen in the truth table.

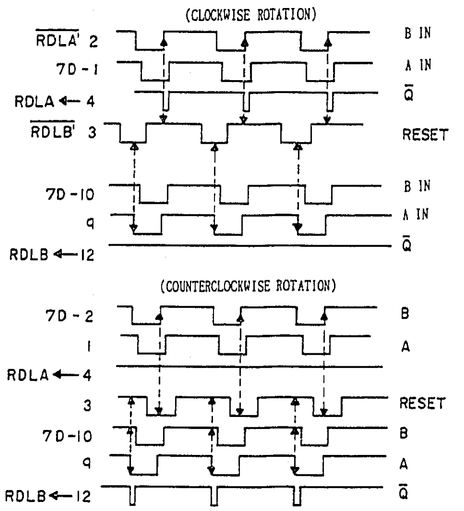


Fig. 9

<HC123 Truth Table> TABLE 3

Input			Output	
$\overline{RESET}$	$\overline{A}$	B	Q	$\overline{Q}$
L	X	X	L	H
X	H	X	L	H
X	X	L	L	H
H	L	↑	⊓	⊔
H	↓	H	⊓	⊔
↑	L	H	⊓	⊔

9-4. Jog mode control

In the jog mode, the playback speed changes from still to normal (X1) speed play according to the speed at which the dial is turned in both the forward and reverse directions. Z84C30A uses the clockwise rotation direction information (RDLA) and counterclockwise rotation direction information (RDLB) to calculate the speed at which the dial is being turned and determines the playback speed and direction by the corresponding system, communicates with the CPU (8A) via the serial/parallel inverter (10C) and remote controls the playback speed of the VTR via a 9-pin interface.

9-5. Shuttle mode control

The "Lo" ("Hi") RSRC discrimination signal is supplied from the jog/shuttle dial in the shuttle (jog) mode. Receiving this signal, 10C discriminates between the jog or shuttle mode. The center position is determined in the shuttle mode and "Hi" RCNT signal is supplied when the shuttle is centered.
In the shuttle mode, the playback speed must be shifted in steps to match the direction and angle of dial rotation. To do this, when RCNT which indicates the center is detected by 10C, Z84C30A (9B) calculates clockwise and counterclockwise rotation inputs RDLA and RDLB to detect the direction of rotation and angle of the dial and supplies information on the playback speed and direction corresponding to the dial position to the CPU. Using this information, the CPU (8A) and serial/parallel interface (10C) remote control the playback mode of the VTR through a 9-pin interface.

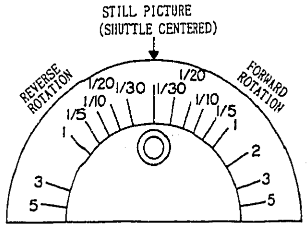


Fig. 10

10. MEMORY/I/O MAP

MEMORY MAP

0000 7FFF	EP ROM	Program area of Z84C00 (CPU)
8000 FFFF	RAM	Work area of Z84C00 (CPU)

PIO:Parallel I/O
CTC:Counter/Timer Control
SIO:Serial I/O
PIA:Parallel Interface Adapter
SPCT:Serial Parallel Counter Timer
KDC:Key/Display Control
USART:Universal Synchronous Asynchronous Receiver Transmitter
RF:Register File

I/O MAP

ADDRESS		DEVICE	DETAILS	
00	A0~A3	Z84C90	PIO	Port A data
01		Z84C90	PIO	Port A command
02		Z84C90	PIO	Port B data
03		Z84C90	PIO	Port B command
04		Z84C90	CTC	Channel 0
05		Z84C90	CTC	Channel 1
06		Z84C90	CTC	Channel 2
07		Z84C90	CTC	Channel 3
08		Z84C90	SIO	Channel A data
09		Z84C90	SIO	Channel A command/status
0A		Z84C90	SIO	Channel B data
0B		Z84C90	SIO	Channel B command/status
0C		Z84C90	PIA	Port C data
0D		Z84C90	PIA	Port C command
0E		Z84C90	SPCT	Command
0F		Z84C90	Reserve	
10	A0~A1	Z84C30	CTC	Channel 4
11		Z84C30	CTC	Channel 5
12		Z84C30	CTC	Channel 6
13		Z84C30	CTC	Channel 7
20	A0	Z82C79	KDC	Data
21		Z82C79	KDC	Command/Status
30	A0	Z82C51	USART	Data
31		Z82C51	USART	Control
80	A0~A1	74HC670	RF	Port 0
81		74HC670	RF	Port 1
82		74HC670	RF	Port 2
83		74HC670	RF	Port 3
90	A0~A1	74HC670	RF	Port 4
91		74HC670	RF	Port 5
92		74HC670	RF	Port 6
93		74HC670	RF	Port 7

<I/O Address Map (Details)>

ADDRESS	IN/OUT	BIT NO.							
		7	6	5	4	3	2	1	0
00	IN	EPROM BUZY	EPROM DOUT	R SEARCH	P SEARCH	R CENTER	P CENTER	0	0
00	OUT				–				
01	IN				–				
01	OUT				COMMAND				
02	IN				–				
02	OUT	EPROM CE	EPROM SCK	EPROM DIN	–	–	BUZZ	CUE REC	CUE X
03	IN				–				
03	OUT				COMMAND				
04	IN	REC	DIAL	RIGHT		COUNTER			
04	OUT				–				
05	IN	REC	DIAL	LEFT		COUNTER			
05	OUT				–				
06	IN	PLAY	DIAL	RIGHT		COUNTER			
06	OUT				–				
07	IN	PLAY	DIAL	LEFT		COUNTER			
07	OUT				–				
08	IN	REC VTR			RECEPTION DATA				
08	OUT	REC VTR			TRANSMISSION DATA				
09	IN	REC VTR			RECEPTION STATUS				
09	OUT	REC VTR							
0A	IN	PLAY VTR			RECEPTION DATA				
0A	OUT	PLAY VTR			TRANSMISSION DATA				
0B	IN	PLAY VTR			RECEPTION STATUS				
0B	OUT	PLAY VTR							
0C	IN	DIP SW 1	2	3	4	5	6	7	DIP SW 8
0C	OUT			–					
0D	IN			–					
0D	OUT			COMMAND					
0E	IN			–					
0E	OUT			COMMAND					
0F	IN			RESERVE					
0F	OUT			RESERVE					

Z84C90 has 16 internal resistors which are accessed by the address bus A0～A3 control

ADDRESS	IN/OUT	BIT NO.							
		7	6	5	4	3	2	1	0
10	IN				Frame pulse				
10	OUT				Command				
11	IN		PLAY2	RX	RDY				
11	OUT				Command				
12	IN		PLAY2	TX	RDY				
12	OUT				Command				
13	IN				Key interrupt				
13	OUT				Command				
20	IN				Key sense data				
20	OUT				Segment LED data				
21	IN		KDC		Status				
21	OUT		KDC		Command				
30	IN		PLAY2	USART	Reception data				
30	OUT		PLAY2	USART	Transmission data				
31	IN		PLAY2	USART	Status				
31	OUT		PLAY	USART	Command				
80	IN	-PREROLL- 3	7	-SYNC- OFF	ON/OFF	DIP SW 7	8	9	DIP SW 10
80	OUT	P2	P1	PLAY STDBY	–	PLAY PLAY	PLAY PAUSE	PLAY REW	PLAY FF
81	IN	"1"	"1"	"1"	"1"	DIP SW 3	4	5	DIP SW 6
81	OUT	REC	EDIT	REC STDBY	–	REC PLAY	REC PAUSE	REC REW	REC FF
82	IN	"1"	"1"	"1"	"1"	-REC- CTL	TC	DIP SW 1	DIP SW 2
82	OUT	A/B ROLL	P2→P1	AUDIO SPLIT	ASM	V	A1	A2	–
83	IN	(Image (Indefinite))				-PLAY2- CTL	TC	-PLAY1- CTL	TC
83	OUT	–	–	–	–	PREVIEW	AUTO EDIT	–	REVIEW
90	IN								
91	OUT	REC	REC	REC	–	TOTAL	REC SERVO	REC OUT	REC IN
92	IN								
93	OUT	PLAY	PLAY	PLAY	–	DPC P1	PLAY1 SERVO	PLAY1 OUT	PLAY1 IN
94	IN								
95	OUT	–	–	–	–	DPC P2	PLAY2 SERVO	PLAY2 OUT	PLAY2 IN
96	IN								
97	OUT	–	–	–	–	–	–	–	–

NEGATIVE LOGIC

KDC(KEY DISPLAY CONTROL)

KEY	BIT NO.							
	7	6	5	4	3	2	1	0
RO	"0"	"0"	"0"	"0"	"0"	LEARN	CUE ×	CUE REC
1	"0"	"0"	"0"	"0"	"0"	PLAY RESET	REC RESET	TOTAL
2	P1	P2	PLAY STDBY	PLAY EJECT	PLAY PLAY	PLAY PAUSE	PLAY REW	PLAY FF
3	REC	EDIT EDIT	REC STDBY	REC EJECT	REC PLAY	REC PAUSE	REC REC	REC FF
4	A/B ROLL	P2→P1	AUDIO SPLIT	ASM	V	A1	A2	–
5	LAST EDIT	LAST ×	PLAY IN	PLAY OUT	PLAY ENT	REC IN	REC OUT	REC ENT
6	–	+	GOTO	PREROLL	REVIEW	AUTO EDIT	ALL STOP	REVIEW
7	–	–	–	–	–	–	–	–

LED

	7 6 5 4	3 2 1 0	
0	X10F	F	REC
1	X10S	S	
2	X10M	M	
3	X10H	H	
4	X10F	F	PLAY
5	X10S	S	
6	X10M	M	
7	X10H	H	

LED DATA

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	1	2	3	4	5	6	7	8	9	A	P	U	–	E	BLK

SERIAL TRANSMISSION NETWORK

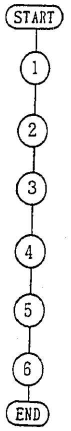
(1) Transmission specifications
- (1) Standard: Based on RS-422A
- (2) Synchronization: Start-stop sync system
- (3) Transmission system: Full duplex
- (4) Transmission speed: 38.4 Kb/s
- (5) Data format
  - a. START BIT 1
  - b. DATA BIT 8
  - c. PARITY BIT (ODD) 1
  - d. STOP BIT 1

(2) Command format

Command 1	Data count	Command 2	Data 1	))	Data n	Check SUM
← 1 BYTE →		←1 BYTE→	←1 BYTE→	← →	←1 BYTE→	←1 BYTE →

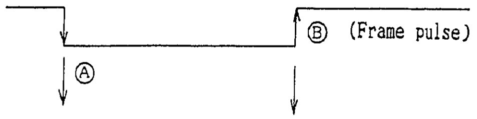
SEQUENCE PROCESS CHART DURING EDITING

Press the AUTO EDIT button to exucute the following items.



1. Prerolling
   Issues CUE UP commands to each VTR. Or, preroll the VTRs using the shuttle.
2. Starting VTRs
   After completing CUE UP of each VTR, starts the VTRs to match the pinch roller on delay time which was obtained by the LEARN function.
3. Cutting in
   Calculates the cut in delay time of the recording VTR and issues a CUT IN command.
4. Cutting out
   Calculates the cut out delay time in the same way as in step 3 and issues a CUT OUT command.
5. Stopping the VTRs
   Stops each VTR approx. 2 seconds after cutting out.
6. Returning the recording VTR to the OUT point.
   Or, Perform processing using shuttle search.

COMMAND TRANSFER TIMING



Executes time code request process at this trailing edge.

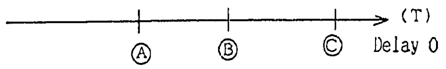
Executes VTR status request or transfers command at this trailing edge.
○ If there is no transfer command, requests the VTR status.
○ If there is a command, transfers a command instead of the VTR status request.

1. Prerolling

Checks the VTR status after transferring the CUE UP command (complete when the CUE UP bit is "1").
Also checks for abnormal end and generates the E-07 error message when the "PREROLL" bit goes "0" during CUE UP, etc.

2. Starting VTRs

Times the starting of the VTRs using the data obtained by the LEARN function and issues the commands.



Time in which timing can be obtained: Current (-20 frame to) frame.
Down-counts from -20 frame to point (A) for (A) VTR. Issues a PLAY command when it reaches "0".
Same for (B).
(Synchronized with V.SYNC in REF. VIDEO)

* If there is no REF VIDEO input, the internal timing is used.

3.4. Cutting in and out

Calculates the actual IN points (command issue point) based on the cut in delay time of the recording VTR.

IN 00:00:08:07
Cut in delay: 12nd frame
00:00:08:07
- 12
00:00:07:25

In this case, the CUT IN command is issued when the count reaches 7 seconds 25 frames. Calculates the OUT point in the same way, and issues the CUT OUT command according to the time.

5. Stopping the VTRs

Supplies a stop command 2 seconds after the OUT point.

6. CUE UP to OUT point

Performs the same process as in step 1 for the OUT point of the recording VTR.

VL-AC10 OPERATION THEORY

1. FUNCTIONS OF VL-AC10

1. DC voltage source: Rated voltage 13.5V, input voltage 100-120V
2. Battery charge: 2 batteries inserted simultaneously, $-\Delta V$ charge, charge time: 80 minutes/each
3. Alarms: Overvoltage, overcurrent, exhausted battery detection, load open detection
4. Constant current charge: 1.8A constant current charge, trickle charge
5. Protection functions: Initial 5-minute timer, 90- minute timer

2. VL-AC10 FUNCTION BLOCK DIAGRAM

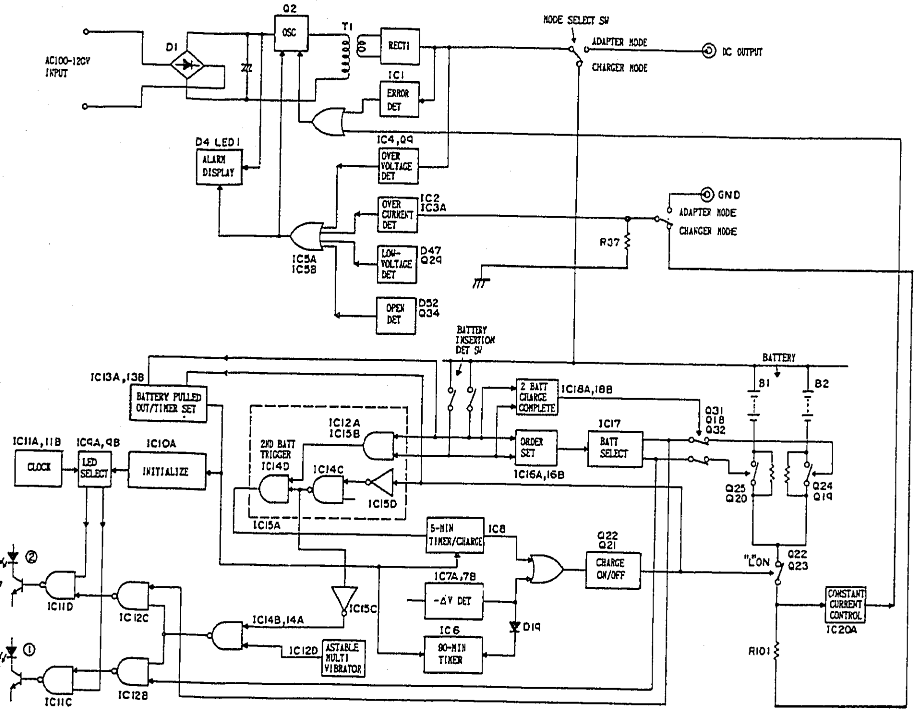

Q2
OSC
T1
RECTI
IC1
ERROR DET
AC100-120V INPUT
D1
D4 LED1
ALARM DISPLAY
IC4,Q9
OVER VOLTAGE DET
IC2
IC3A
OVER CURRENT DET
IC5A
IC5B
LOW-VOLTAGE DET
D47
Q29
OPEN DET
D52
Q34
MODE SELECT SW
ADAPTER MODE
CHARGER MODE
DC OUTPUT
GND
ADAPTER MODE
CHARGER MODE
R37
BATTERY INSERTION DET SW
BATTERY
B1
B2
IC13A,13B
BATTERY PULLED OUT/TIMER SET
IC11A,11B
CLOCK
IC9A,9B
LED SELECT
IC10A
INITIALIZE
IC12A
IC15B
2ND BATT TRIGGER
IC14D
IC14C
IC15D
IC15A
2 BATT CHARGE COMPLETE
IC18A,18B
ORDER SET
IC16A,16B
IC17
BATT SELECT
Q31
Q18
Q32
Q25
Q20
Q24
Q19
5-MIN TIMER/CHARGE
IC8
Q22
Q21
CHARGE ON/OFF
"L"ON
Q22
Q23
IC7A,7B
-ΔV DET
D19
IC6
90-MIN TIMER
CONSTANT CURRENT CONTROL
IC20A
R101
LED5
②
Q27
IC11D
IC12C
IC15C
IC14B,14A
IC12D
ASTABLE MULTI VIBRATOR
LED4
①
Q26
IC11C
IC12B

Fig.1

3. CONSTANT VOLTAGE CONTROL OPERATION (FIG. 2)

The cathode voltage V_K of IC1 is given as follows.

Adapter mode: $V_K \fallingdotseq (1+\frac{R_{22}+VR_1}{R_{28}+R_{25}})V_{REF} \fallingdotseq 13.9V$

Charger mode: $V_K \fallingdotseq (1+\frac{R_{22}+VR_1}{R_{25}})V_{REF} \fallingdotseq 20.8V$

($V_{REF} = 2.495V$)

When V_{out} rises, current which is proportional to the difference between V_{out} and V_K flows through a photodiode in PC1. The impedance of a pair of phototransistors decreases, the negative feedback signal of the primary circuit increases and the carrier frequency rises, and at the same time, the duty becomes low, causing the voltage (V_{out}) in the secondary circuit to decrease so that it is regulated at a constant voltage.

In the charger mode, the impedance between the collector and emitter of Q6 is changed by the constant current charge control described in item 4 and V_{out} changes so that constant current flows to R101. As charging progresses, V_{out} rises. When a battery is not loaded, V_{out} is the highest.

○ Oscillation

When the power is supplied, a bias voltage is applied to the gate of Q2 and current starts to flow in the primary winding of T1. Since the gate of Q2 is connected so that the auxiliary winding coupled to the primary winding has a positive feedback signal, Q2 is still on. The current flowing in the primary winding continues to increase, and when it reaches the drain current which is proportional to the gate voltage, it is saturated and decreases, and Q2 is abruptly turned off by positive feedback. The energy stored in the primary winding decreases and it returns to the original state; this procedure is repeated.

4. CONSTANT CURRENT CHARGE OPERATION (FIG. 2)

When a battery is inserted, charge current (I_{CG}) flows through a transistor switch and R101, and a voltage drop of $V_W = I_{CG}R101$ occurs across R101. This voltage drop is applied to the positive terminal of IC20A which compares it with the reference voltage at IC19 and amplifies the error voltage. When the error voltage is positive high, it shows that the charge current is high. The error output is applied to Q6 to decrease its impedance.
The current flowing to the photodiode increases and V_{out} drops. Therefore, the charge current decreases and is controlled so that it is constant. $V_K = V_{REF} = 2.495V$

$$V- \fallingdotseq \frac{R_{99}}{R_{98}+VR_4+R_{99}} Vk \fallingdotseq 98mV$$

$$I_{CG} \fallingdotseq \frac{Vw}{R101} \fallingdotseq \frac{98}{50} \fallingdotseq 1.96A$$

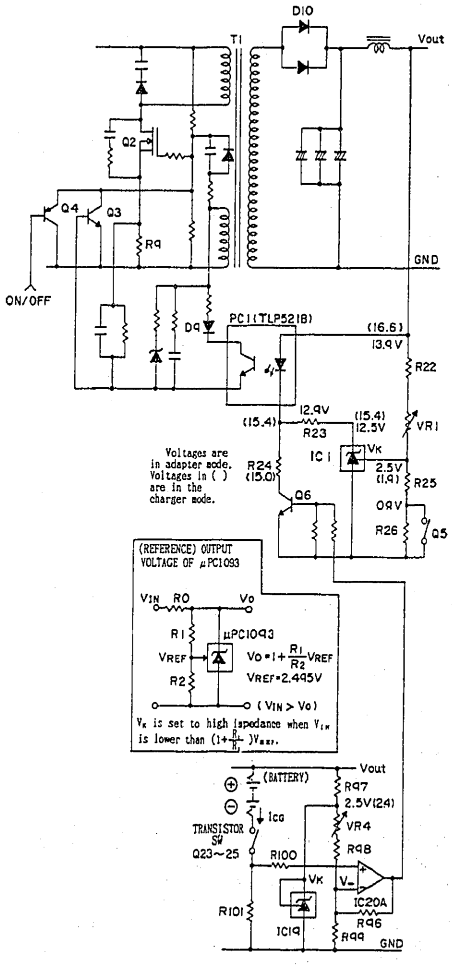

D10
T1
Vout
Q2
Q4
Q3
R9
ON/OFF
GND
D9
PC1(TLP521B)
(16.6)
13.9V
R22
12.9V
(15.4)
R23
(15.4)
12.5V
VR1
IC1
VK
2.5V
(1.9)
R25
R24
(15.0)
Q6
0.9V
R26
Q5
Voltages are in adapter mode. Voltages in ( ) are in the charger mode.
(REFERENCE) OUTPUT VOLTAGE OF μPC1093
VIN
RO
Vo
R1
μPC1093
VREF
Vo=1+R1/R2 VREF
VREF=2.495V
R2
(VIN > Vo)
VK is set to high impedance when VIN is lower than (1+R1/R2)VREF.
(BATTERY)
Vout
R97
2.5V(2.4)
ICG
VR4
TRANSISTOR SW
Q23~25
R98
R100
VK
V-
IC20A
R101
R96
IC19
R99
GND

Fig. 2

5. ALARM DISPLAYS

5-1. Causes of alarm displays

1. When overvoltage occurs: 15V or more in the adapter mode, 21V or more in the charger mode
2. When overcurrent occurs: 5.5A or more in the adapter mode, 2.7A or more in the charger mode
3. When charge current does not flow
4. When a voltage does not rise over 9V with an exhausted battery (after 5 minutes have passed)

5-2. CIRCUIT OPERATION

5-2-1. Overall operation

When an alarm occurs, a "high" voltage is applied to pins 1 and 2 of IC5A through D11 in case of item 1 above, R44 in case of item 2, D48 in case of item 3 and D13 in case of item 4. IC5A pin 3 goes "low" and is applied to IC5B with a discharge time constant determined by C31 and R45, and IC5B pin 4 goes "high".
Q10 turns on, current flows to photothyristor PC2 (TLP541G), pins 5 and 4 of PC2 are activated and Q1 turns off. Therefore, the voltage at C9 starts to rise. When it exceeds the break-over voltage of DIAC D4 (N413M), D4 turns on and current flows. When C9 is discharged, the voltage decreases and D4 turns off. This charges C9 again. This procedure is repeated. The alarm display LED flashes at this time. At the same time, the base current of Q4 increases, so the emitter voltage of Q4 drops, the gate voltage of Q2 drops and Q2 turns off.
DIAC D4 is a bidirectional diode with negative impedance as shown in Fig. 3.

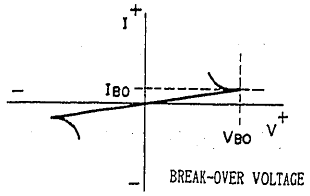


Fig. 3

5-2-2. Overvoltage detection (Fig. 4)

The cathode voltage V_K of IC4 is given as follows.

Charger mode: $V_K \fallingdotseq (1+\frac{R_{39}+VR_3}{R_{40}})V_{REF} \fallingdotseq 22V$ (Q8 is on)

Adapter mode: $V_K \fallingdotseq (1+\frac{R_{39}+VR_3}{R_{40}+R_{41}})V_{REF} \fallingdotseq 15V$ (V_{REF}= 2.495V, VOL: Center)

When V_{out} rises more, Q9 turns on and overvoltage is detected.

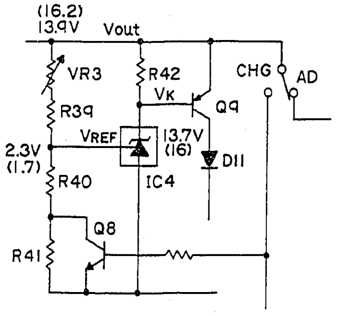

(16.2)
13.9V
Vout
VR3
R42
CHG
AD
VK
R39
Q9
VREF
13.7V
(16)
2.3V
(1.7)
D11
R40
IC4
Q8
R41

Fig. 4

5-2-3. Overcurrent detection (Fig. 5)

The input voltage V- at the negative terminal of IC3A is as follows.

$V- = \frac{R_{36}}{R_{36}+R_{37}} V_K$: Reference voltage

Adapter mode: $V_K \fallingdotseq (1+\frac{R_{32}+VR_2}{R_{33}})V_{REF} \fallingdotseq 6.4V$

Charger mode: $V_K \fallingdotseq (1+\frac{R_{32}+VR_2}{R_{33}+R_{34}})V_{REF} \fallingdotseq 3V$

$V+ = I_L R37$: Comparison voltage
When the load current I_L increases and V+ minus V - is larger than or equal to zero, IC3A output goes "high" and overcurrent (8.8A in the adapter mode and 4.1A in the charger mode) is detected

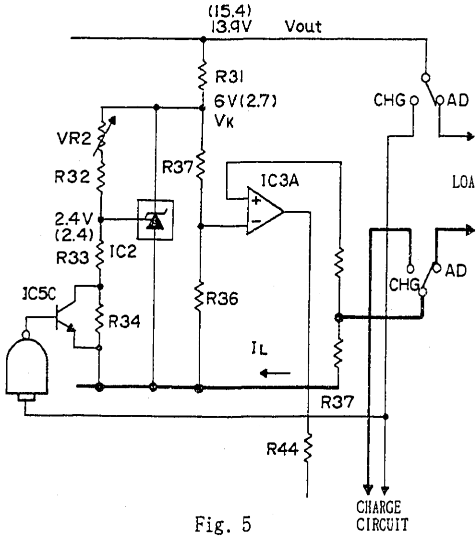

(15.4)
13.9V
Vout
R31
6V(2.7)
VK
CHG
AD
VR2
R32
R37
IC3A
LOAD
2.4V
(2.4)
R33
IC2
CHG
AD
IC5C
R34
R36
IL
R37
R44
CHARGE CIRCUIT

Fig. 5

5-2-4. Open load detection (Fig. 6)

When a battery is loaded, Q24 or Q25 turn on and Q23 turns on, and the battery is charged through a path from V_{out} to $\boxed{2}$ (alternate long and short broken line). If current does not flow due to a defective contact of the positive or negative terminal, the constant current control regulates the voltage across R101 so that it is constant, therefore V_{out} rises rapidly. A Zener diode D52 (Vz=20V) connected to the base of Q34 turns on when V_{out} exceeds 20V, Q34 also turns on and D48 goes "high", thus detecting open load.

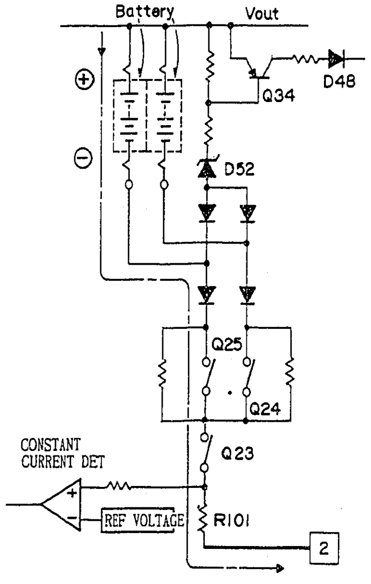

Battery
Vout
D48
⊕
Q34
⊖
D52
Q25
Q24
CONSTANT CURRENT DET
Q23
REF VOLTAGE
R101
2

Fig. 6

5-2-5. Exhausted battery low-voltage detection

When an exhausted battery is to be charged, a voltage does not rise and V_{out} does not rise to 9V. When charging is started, a timer in IC8 starts and IC8 pin 3 goes "high" for 5 minutes and then goes "low". Therefore, Q28 turns off and detection is started. If V_{out} is less than 9V at this time, Q29 turns off because Zener diode D47 with Vz=7.5V is connected to the base of Q29, and V_{out} is output to D13 as "high" through R118 and a low voltage is detected.

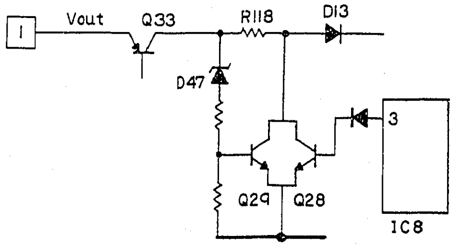

1
Vout
Q33
R118
D13
D47
3
Q29
Q28
IC8

Fig. 7

6. -ΔV CHARGING

A NiCd battery has a characteristic that voltage decreases after it is fully charged. The -ΔV charging method uses this characteristic to detect that charging is completed.

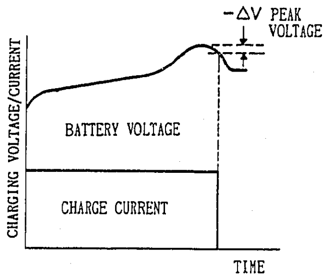


Fig. 8

6-1. Detection operation (Fig. 9)

When charging is started, the charge voltage V_{out} rises. This V_{out} voltage is applied to the positive input of IC7A through transistor switch Q33 and D21. IC7A is a differential amplifier with one-time voltage amplification and charges C43 with the input voltage supplied through Q35. After the battery is fully charged, the charge voltage (V_{out}) starts to decrease, but the discharge constant determined by C43 and R64 is high and the voltage across C43 is held at a peak (V_{peak} -Vz) of full charge, and is applied to the negative input of IC7B. On the other hand, the input (V+) to the positive terminal of IC7B is as follows.

$$V+ = \frac{R_{61}V_7+R_{62}(V_{out}-Vz)}{R_{61}+R_{62}} = V_{out} - \frac{R_{62}}{R_{61}+R_{62}}Vz \quad (V_7=V_{out})$$

After the battery is fully charged, charging is assumed to be completed by the voltage decreased by 200mV (ΔV). The positive input (V+) at this time is as follows, taking V_{out}= V_{peak}-ΔV into consideration.

$$V+ = (V_{peak}-\Delta V)- \frac{R_{62}}{R_{61}+R_{62}} Vz = V- = V_{peak}-Vz$$

$$\therefore \frac{R_{61}}{R_{61}+R_{62}} = \frac{\Delta V}{Vz} = \frac{0.20}{5.1}$$

That is, a peak voltage is applied to the negative input of IC7B, and on the other hand, the positive input decreases as the charge voltage decreases. When V+ is lower than or equal to V-, the IC7B output inverts to "low" and this detection output turns Q21 off via D42 to complete charging.
As the negative input of IC7B has peak hold characteristics, it is set to high impedance. The leak current from C43, Q15 and circuit board, etc. affects the operation.

6-2. Protection functions (Fig. 9)

6-2-1. Protection timer

When -ΔV is not detected for some reason after charging is started, the timer is activated for protection and completes charging forcibly. IC6 is set when charging is started and outputs "low" via D19 after 90 minutes to complete charging forcibly (-ΔV is detected after 80 minutes).

6-2-2. Initial timer

When charging starts, the -ΔV characteristic is shown. The initial timer cancels -ΔV detection during this time. IC8 is set to "high" when charging is started and turns Q15 on through D27 to suppress -ΔV detection. After 5 minutes, the timer is released, Q15 turns off and -ΔV detection operates.

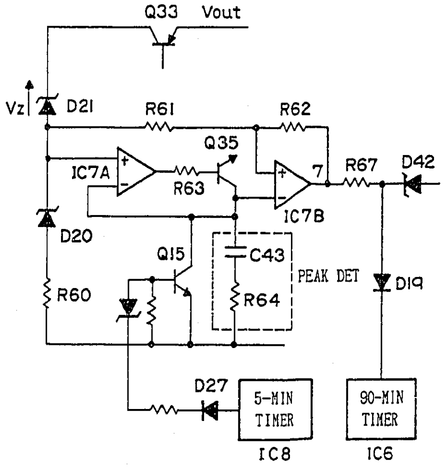


Fig. 9

6-3. Charging

6-3-1. When charging one battery

A battery is loaded: SW3 makes contact (when it is inserted in No. 1)

Ⓐ : Q11 turns on via diode D34. Q33 and Q12 turn on. The power supply is connected.
Ⓐ : IC16A and IC16B which form an R-S flipflop are set, pin 3 goes "low" and pin 4 goes "high".
Ⓑ : The input to IC16D changes from "low" to "high" since C49 is charged. The output pin 11 of the NAND gate changes from "high" to "low" which becomes the RESET pulse input of IC17.
Ⓒ : Since "high" is input to RESET, the Q output (pin 1) of IC17 goes "low". Q20 and Q25 turn on and Q19 and Q24 turn off.
Ⓐ : IC12A pin 1 goes "low" and pin 3 goes " high" Which supplies the RESET inputs of IC18A,B.
Ⓑ : Since the RESET inputs of IC18A,B are set to "high", Q2 (pin 15) is reset to " low".
Ⓒ : Q31 turns off and Q18 and Q32 turn on.
Ⓑ : IC15B's output goes "low", IC4D's output goes "high", IC15A's output goes "low" and Q13 turns on.
Ⓐ : The initial timer in IC8 starts and " high" is output to pin 3.
Ⓑ : Q15 turns on, IC7B pin 7 goes "high", and Q21-Q23 turn on.
: Since transistor switches Q25 and Q23 turn on, the charge current flows to battery B1, and charging starts. (The charge current is detected by R101 and controlled by IC20A so that it becomes a constant current.)
: When -ΔV is detected after the battery is fully charged, IC7B pin 7 goes "low", Q21 turns off and Q22 and Q23 turn off, and charging stops.

TC4027BP Truth Table

INPUTS					OUTPUTS	
RESET	SET	J	K	CLOCK	Q_{n+1}	$\overline{Q_{n+1}}$
L	L	L	L	↗	Qn	$\overline{Qn}$
L	L	L	H	↗	L	H
L	L	H	L	↗	H	L
L	L	H	H	↗	$\overline{Qn}$	Qn
L	L	X	X	↘	Qn	$\overline{Qn}$
H	L	X	X	X	L	H
L	H	X	X	X	H	L
H	H	X	X	X	H	H

6-3-2. When charging two batteries

(1) When one battery is loaded after

: The sequence in item 6-3-1 continues.
: IC12A goes "low" and IC15B's output is " high".
: The IC18A,B RESET inputs go "low", but it does not affect the operation.
Ⓐ : When charging of one battery is completed, Q21 turns off and IC14 changes from "low" to "high".
Ⓑ : The both IC14D's inputs go "high", the output goes "low" and IC15A's output goes "high" to turn Q13 off.
Ⓒ : IC8 pin 2 goes "low" which triggers the timer to start. Q15 turns on, IC7B goes " high" and Q21 turns on again. Q22 and Q23 also turn on.
Ⓑ : IC15F output changes from "low" to " high" Which becomes a clock signal of IC17. Since J and K are "high" and S and R are "low", the output is inverted and pin 2 goes "low". Q19 and Q24 turn on and Q20 and Q25 turn off to start charging the second battery.
Ⓑ : A clock pulse delayed by R82 and C15 is input to IC18A. Since J and K are " high" and S and R are "low", the output is inverted and pin 1 goes "high" and pin 2 goes "low". However, it does not affect the operation at this point of changing.
Ⓐ : When charging of the second battery is completed, Q21 turns off in the same way for the first battery.
Ⓑ : IC14C changes from "low" to "high" which is input to IC18B as a clock pulse.
Since IC18B J is "high", K is "low" and S and R are "low", this clock pulse sets the Q output (pin 15) to " high".
Ⓒ : Q31 turns on, Q18 and Q32 turn off, and Q19, Q20, Q24 and Q25 also turn off to stop charging. However, Q21-Q23 turn on by the same procedure, as before, so trickle charging is started through R128 and R129.
Ⓑ : Since IC18B pin 14 goes "low", IC14C continues to be "high" and Q13 continues to be off.

(Reference) When two batteries are inserted, trickle charging is performed for the battery which is not being fast charged to prevent malfuctions caused by surge current when switching.

(2) When two batteries are loaded simultaneously and charged (charging is started from No. 1)
: When power is supplied, the capacitance of capacitor C99 connected to pin 6 of IC16B which forms an R-S flipflop together with IC16A is large, so the rise is delayed. Therefore, pin 3 of the R-S flipflop is initially set to " low" and pin 4 to "high". The input of NAND gate IC16D goes "low" and the output (pin 11) goes "high" until capacitor C49 is charged. The output is applied to IC17 as a RESET pulse and resets pin 1 to "low" and pin 2 to "high", and charging is always started from No.1.
: Since the inputs of IC12A are "high", and "high", the output is "low", but the RESET inputs of IC18A and IC18B go "high" to reset both flipflops until the capacitor C75 is charged.
: The following sequence is the same as the procedure mentioned above.

(Note) When one battery is pulled out after the charging of two batteries is completed, charging of the other battery is started.

7. INDICATORS

7-1. Flashing during charging (Fig. 10)

The three NAND gates, IC12D, IC14A and IC14B, form an astable multivibrator which oscillates at a frequency of approx. 1.5Hz to control the lighting of the LEDs. IC14B is also used to control their turning on and off.
Refer to the timing chart for operations.
When the "high" ON signal is input to pin 6 of

IC14B, the output pin 4 goes "low", IC14A pin 3 goes "high" and IC12D pin 11 goes "low". Capacitor C55 discharges to pin 11 of IC12D and the voltage at pin 5 of IC14B gradually decreases and pin 5 goes "low" after a time twice the discharge time determined by the time constant of R111 and C55.
The outputs of each NAND gate are inverted, C55 is charged from IC12D pin 11 to IC14A pin 3 and IC14B pin 5 goes "high" after twice the time determined by the time constant. This inverts the outputs of each NAND gate again, and oscillations continue.

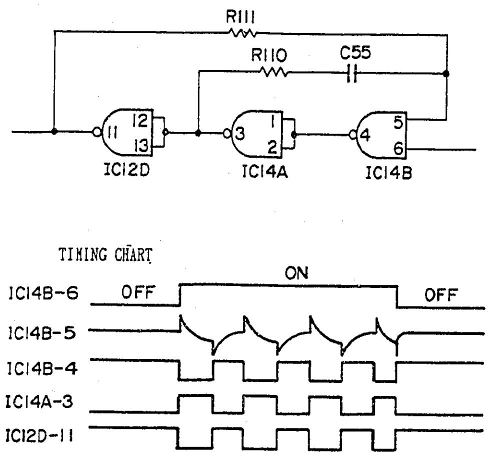

R111
R110
C55
11
12
13
IC12D
3
1
2
IC14A
4
5
6
IC14B
TIMING CHART
ON
IC14B-6
OFF
OFF
IC14B-5
IC14B-4
IC14A-3
IC12D-11

Fig. 10

7-2. Initial reset circuit (Fig. 11)

The NAND gate IC10A generates a pulse to reset a flipflop consisting of IC9A and IC9B when power is started. R109 and C54 provide a difference in the rise to prepare a positive RESET pulse.

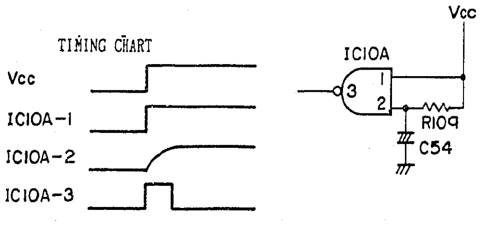

TIMING CHART
Vcc
IC10A-1
IC10A-2
IC10A-3
Vcc
IC10A
3
1
2
R109
C54

Fig. 11

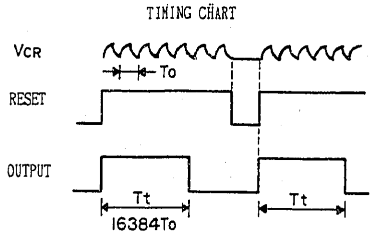
7-3. LED lighting control

○ IC9A and IC9B are reset by the initial reset operation and pins 2 and 14 go "high" to gate IC11C and IC11D.
○ The inputs to IC14C are "high" and "high" and the output is "low", therefore the IC15C output goes "high" and the multivibrator turns on.
○ Since IC17 selects No. 1, Q (pin 1) goes "low" and $\bar{Q}$ (pin 2) goes "high" to open the gate of IC12B and close the gate of IC12C.
○ The pulses generated by the astable multivibrator turn Q26 on and off through IC12B and IC11C, so LED4 flashes.
○ When the charging of battery 1 is completed, Q21 goes "high" and the IC14C output changes from "low" to "high" which becomes a clock pulse of IC9B through IC15C and IC11A. This clock pulse is also applied to IC17, but it is delayed by R82 and C51. Therefore, when a clock pulse is applied to IC9B, IC17 is left unchanged, and since IC9B J is "high" and K, R and S are "low", pin 14 goes "low".
○ Since IC11C pin 8 goes "low", the output goes " high", Q26 turns on and LED4 changes from flashing to steady lighting.
○ The Q and $\bar{Q}$ outputs of IC17 are inverted by the slightly delayed clock pulse and Q (pin 1) is "high" and $\bar{Q}$ (pin 2) is "low".
○ When the charging of battery 2 is started, Q21 goes "low", IC14C pin 1 goes "low", IC15C pin 6 goes "high" and the astable multivibrator starts oscillation.
○ The gate of IC12C opens because IC17C pin 1 goes "high" and the generated pulses turn Q27 on and off through IC11D, and LED5 starts flashing.
○ When charging of battery 2 is completed, IC9A pin 2 goes "low" by the same sequence as battery 1, Q27 turns on and LED5 changes from flashing to steady lighting.

8. TIMER OPERATION (FIGS. 12 AND 13)

Truth Table

Reset	Stop	Oscillation	Output
L	×	Stop	H
H	H	Oscillation	Counting
H	L	Stop	Holds the previous status


TIMING CHART
VCR
To
RESET
OUTPUT
Tt
16384To
Tt

$T_t(\text{sec}) \simeq 11 R_T(k\Omega)\, C_T(\mu F)$

Fig. 12

Starting of the timer (a battery should be inserted)

1. When power is started (after initial reset)
2. When charging is transferred from battery 1 to battery 2, Q13 turns off, so C44 is discharged through D29 and R71. When the voltage drops to the trigger voltage, the timer turns Q13 on again.
3. When a battery is loaded in the charger mode.
4. When two batteries are loaded and the battery being charged is pulled out, the input of IC13A or IC13B changes from "low" to "high", so the monostable multivibrator is triggered and a reset pulse is output from D31 or D33 to start the timer.

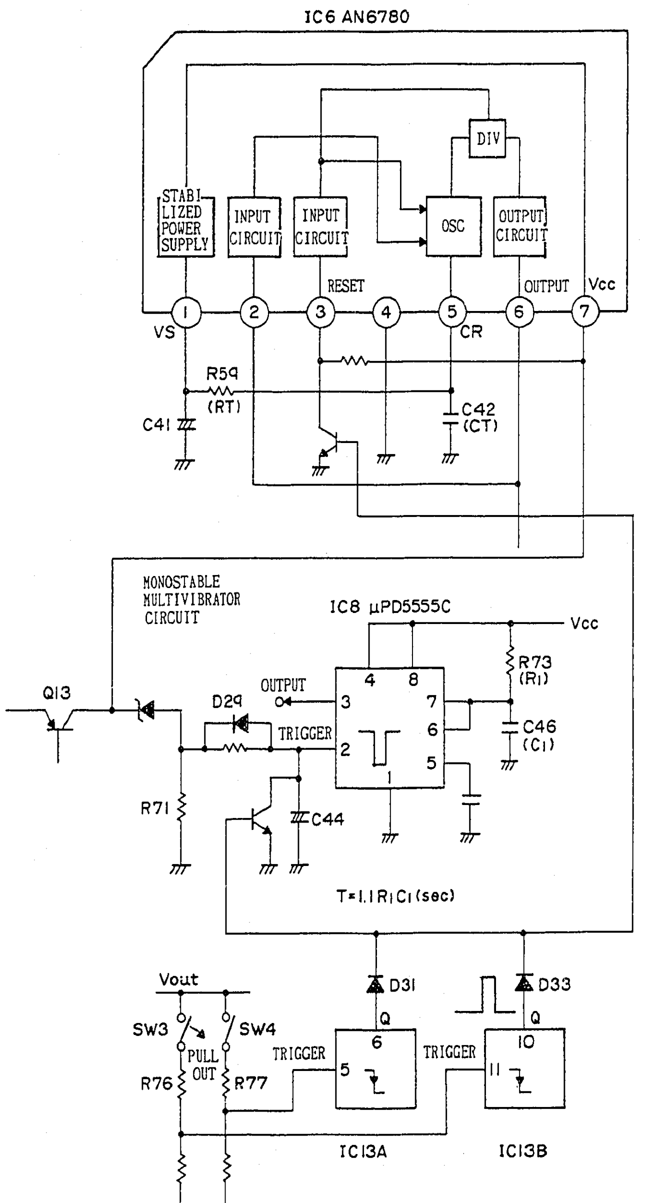

IC6 AN6780
STABILIZED POWER SUPPLY
INPUT CIRCUIT
INPUT CIRCUIT
DIV
OSC
OUTPUT CIRCUIT
RESET
OUTPUT
Vcc
1
2
3
4
5
6
7
VS
CR
R59
(RT)
C41
C42
(CT)
MONOSTABLE MULTIVIBRATOR CIRCUIT
IC8 μPD5555C
Vcc
R73
(R1)
Q13
OUTPUT
D29
TRIGGER
4
8
3
7
6
2
5
1
C46
(C1)
R71
C44
T=1.1R1C1(sec)
Vout
D31
D33
SW3
SW4
Q
Q
PULL OUT
TRIGGER
6
5
TRIGGER
10
11
R76
R77
IC13A
IC13B

Fig. 13

9. TIMING CHART

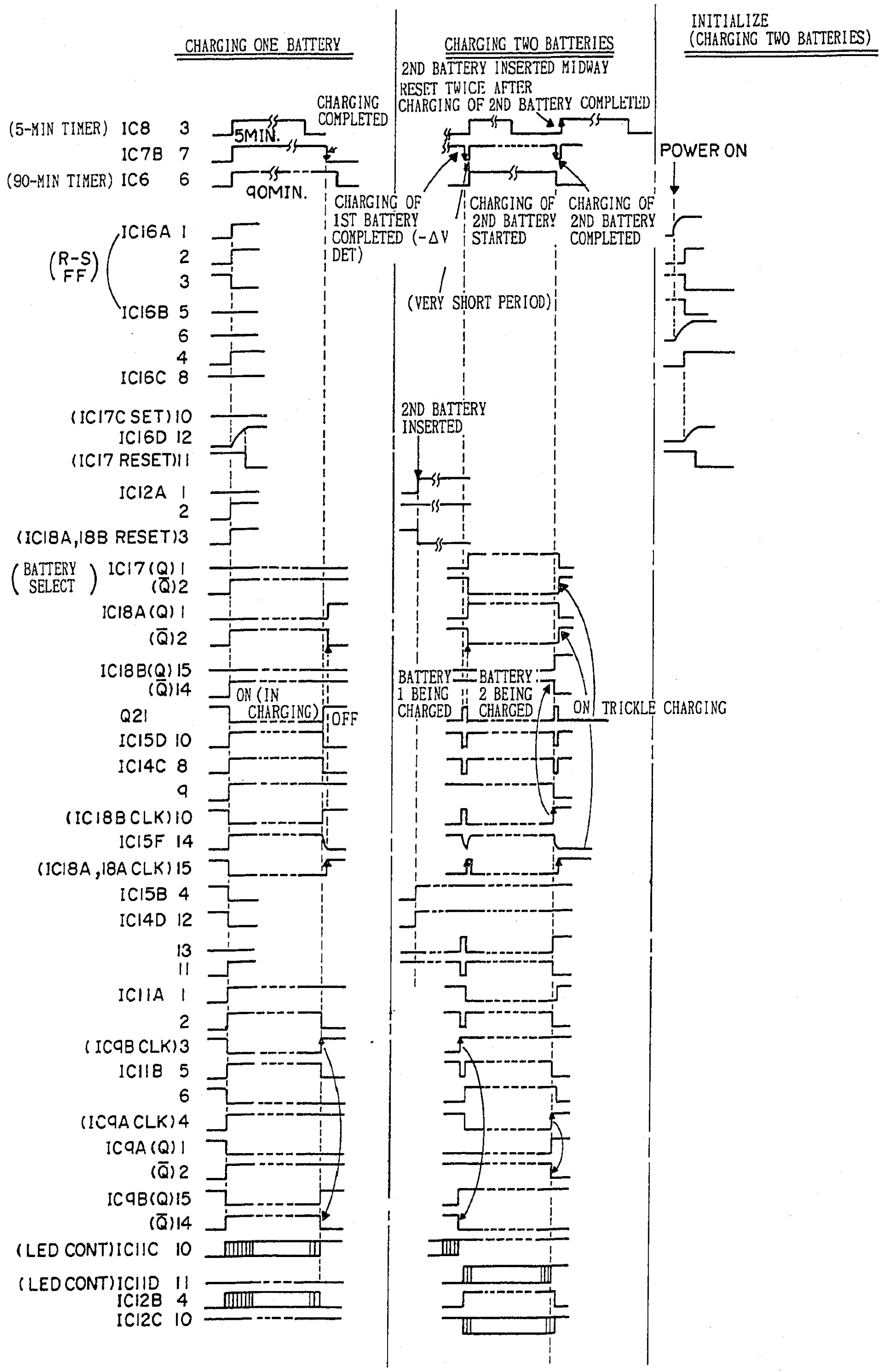
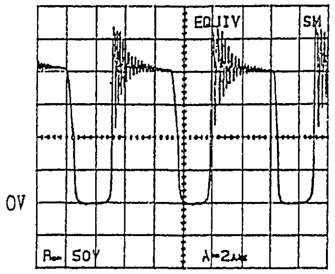

CHARGING ONE BATTERY
CHARGING TWO BATTERIES
INITIALIZE (CHARGING TWO BATTERIES)
2ND BATTERY INSERTED MIDWAY
RESET TWICE AFTER CHARGING OF 2ND BATTERY COMPLETED
CHARGING COMPLETED
POWER ON
5MIN.
90MIN.
CHARGING OF 1ST BATTERY COMPLETED (-ΔV DET)
CHARGING OF 2ND BATTERY STARTED
CHARGING OF 2ND BATTERY COMPLETED
(VERY SHORT PERIOD)
2ND BATTERY INSERTED
BATTERY 1 BEING CHARGED
BATTERY 2 BEING CHARGED
ON TRICKLE CHARGING
ON (IN CHARGING)
OFF
(5-MIN TIMER) IC8 3
IC7B 7
(90-MIN TIMER) IC6 6
IC16A 1
(R-S FF) 2
3
IC16B 5
6
4
IC16C 8
(IC17C SET) 10
IC16D 12
(IC17 RESET) 11
IC12A 1
2
(IC18A,18B RESET) 3
(BATTERY SELECT) IC17(Q) 1
(Q̄) 2
IC18A(Q) 1
(Q̄) 2
IC18B(Q) 15
(Q̄) 14
Q21
IC15D 10
IC14C 8
9
(IC18B CLK) 10
IC15F 14
(IC18A,18A CLK) 15
IC15B 4
IC14D 12
13
11
IC11A 1
2
(IC9B CLK) 3
IC11B 5
6
(IC9A CLK) 4
IC9A(Q) 1
(Q̄) 2
IC9B(Q) 15
(Q̄) 14
(LED CONT) IC11C 10
(LED CONT) IC11D 11
IC12B 4
IC12C 10

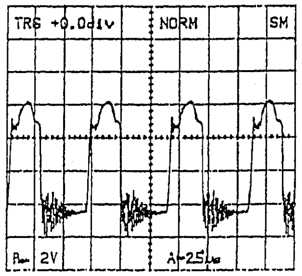
Fig. 14

10. WAVEFORMS ON CIRCUITS

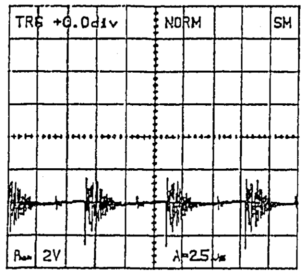
CURRENT: 2A



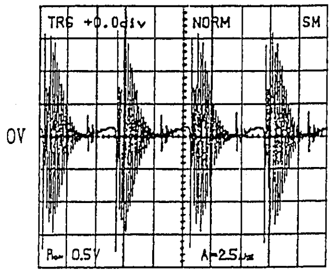
(Q2 DRAIN)



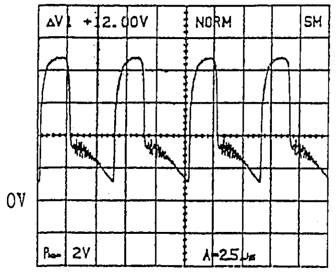
(R130 (OPPOSITE TO Q2 GATE))



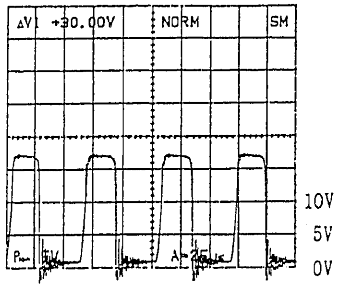
(Q2 SOURCE)



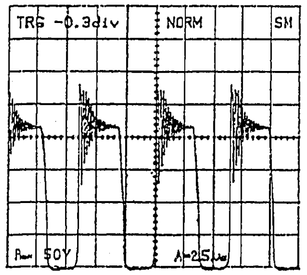
(Q2 SOURCE (SCALE EXPANDED))



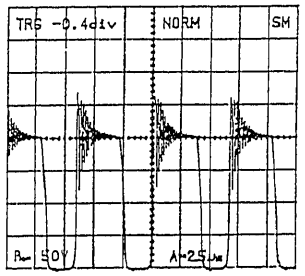
(D9 CATHODE)



[R51]

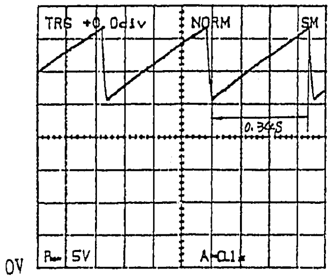


(Q2 DRAIN (END OF CHARGE))

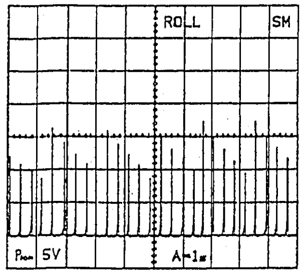


(Q2 DRAIN (START OF CHARGE))

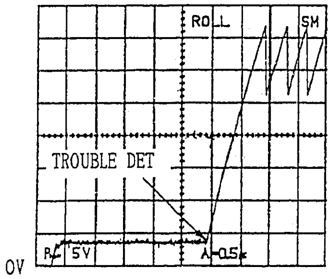
WAVEFORMS IN CIRCUITS WHEN DIAC IS OPERATING



〔 D4-R5 〕



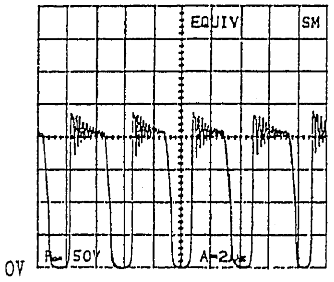
〔 D4-R4 〕



(D4-R5 (TROUBLE DET))

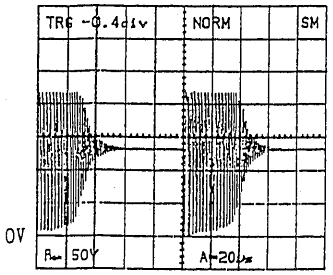
WAVEFORM AT Q2 DRAIN DUE TO CHARGE CURRENT

LOAD: 1A



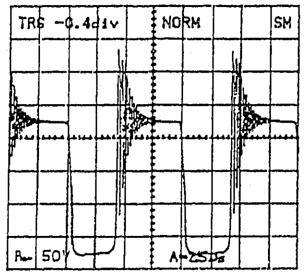
(Q2 DRAIN (ADAPTER MODE))

NO LOAD



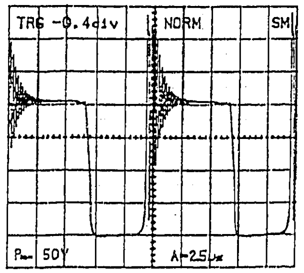
(Q2 DRAIN (ADAPTER MODE))

LOAD: 3A

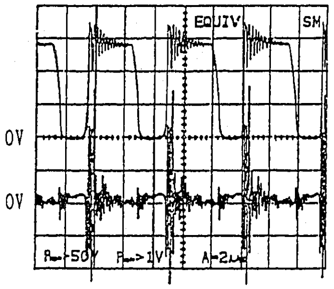


(Q2 DRAIN (ADAPTER MODE))

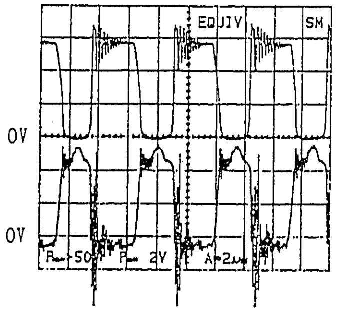
LOAD: 4A



(Q2 DRAIN (ADAPTER MODE))

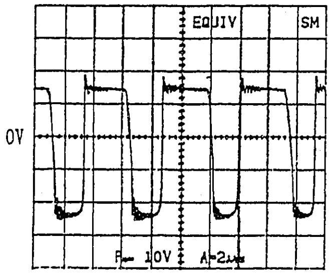


(UPPER: Q2 DRAIN/LOWER: D8 ANODE)



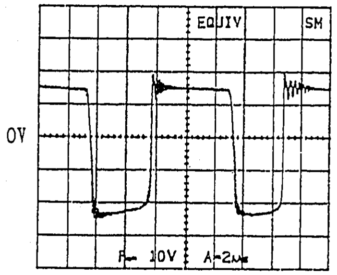
〔 上:Q2ドレイン/下:R130 〕

LOAD: 1.42A

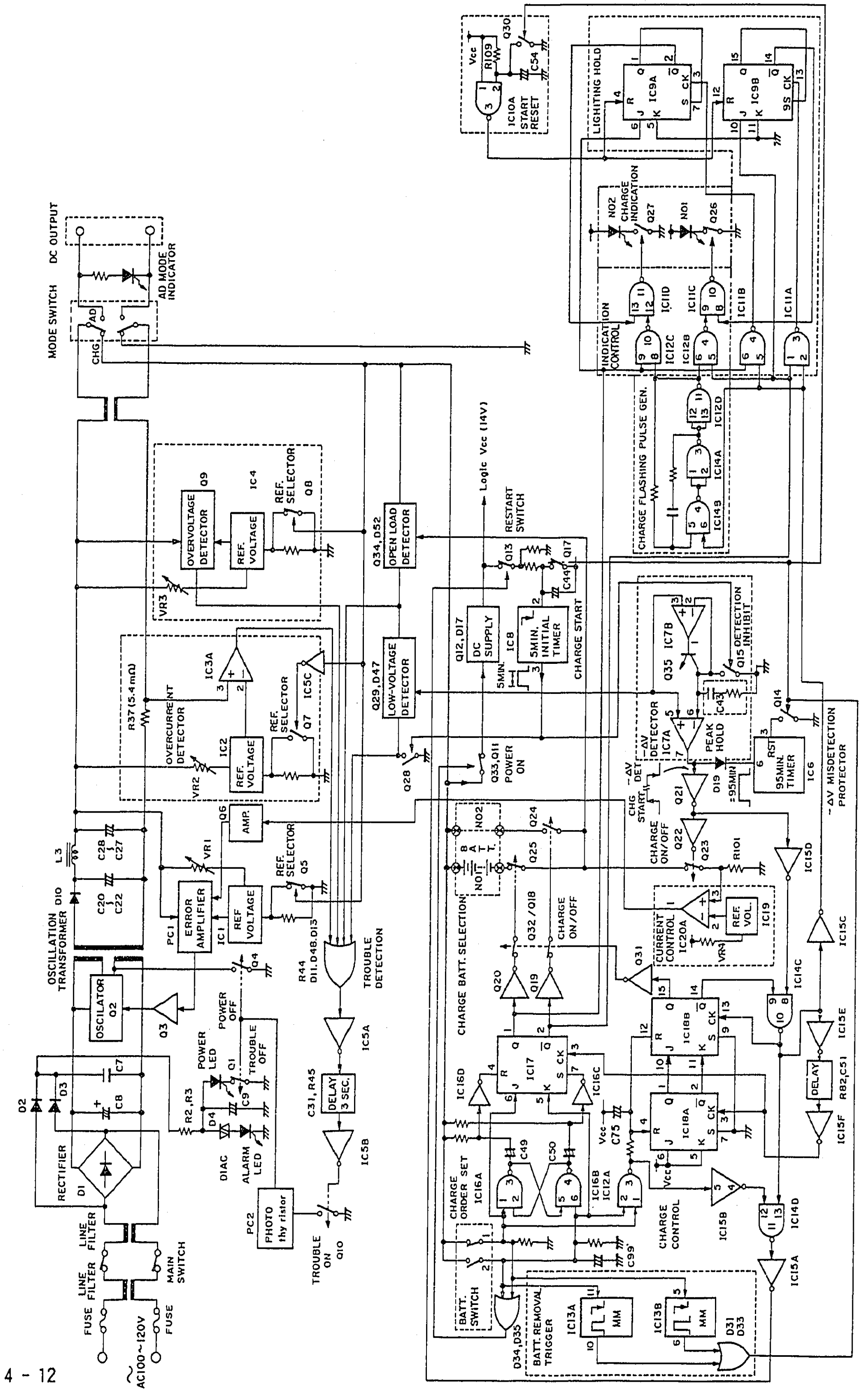


(T1 SECONDARY CIRCUIT
(ADAPTER MODE))

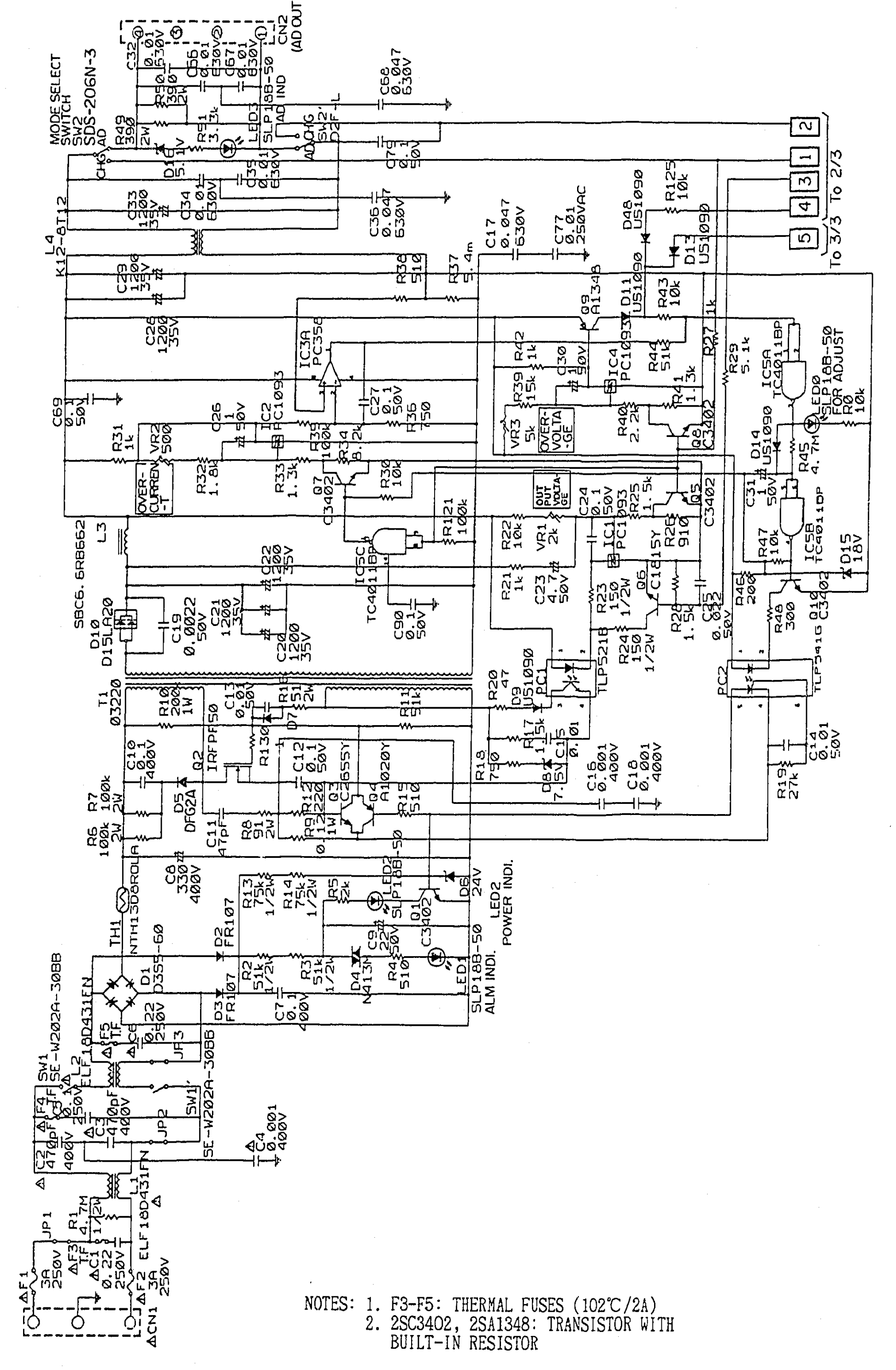
LOAD: 2.84A



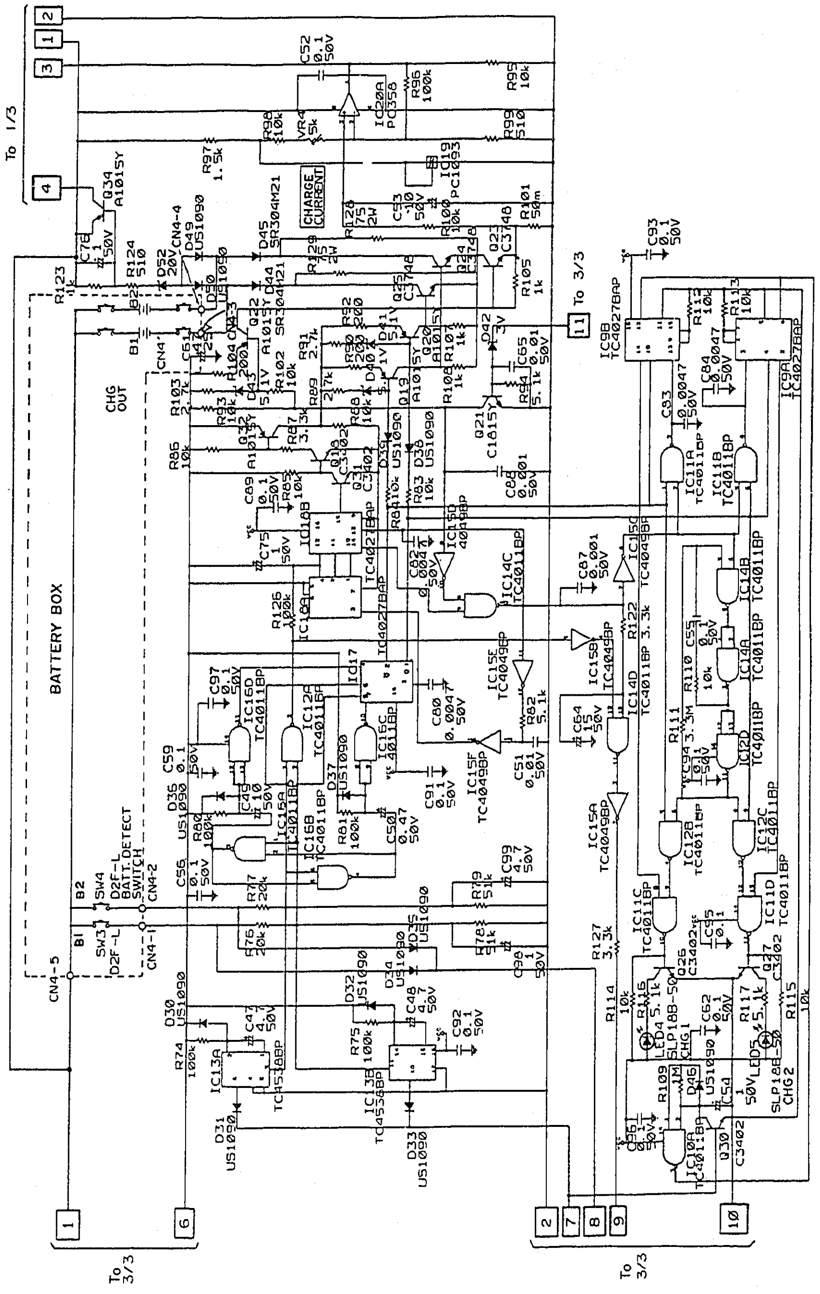
(T1 SECONDARY CIRCUIT
(ADAPTER MODE))

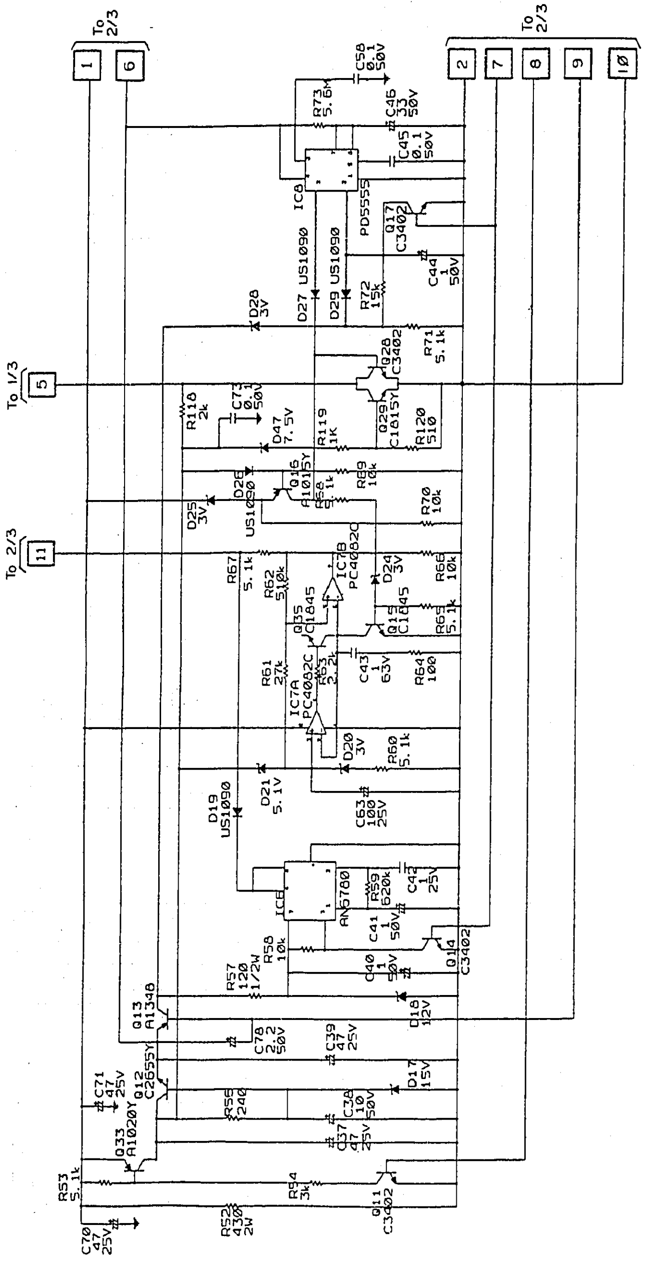

MODE SWITCH
DC OUTPUT
AD MODE INDICATOR
OSCILLATION TRANSFORMER
OSCILLATOR Q2
RECTIFIER D1
LINE FILTER
FUSE
MAIN SWITCH
AC100~120V
PHOTO thyristor PC2
ALARM LED
POWER LED
DIAC
ERROR AMPLIFIER IC1
REF. VOLTAGE
OVERCURRENT DETECTOR IC2
OVERVOLTAGE DETECTOR IC4
REF. SELECTOR
AMP. Q6
R37 (5.4mΩ)
TROUBLE DETECTION
DELAY 3 SEC.
TROUBLE ON Q10
LOW-VOLTAGE DETECTOR Q29,D47
OPEN LOAD DETECTOR Q34,D52
DC SUPPLY Q12,D17
5MIN. INITIAL TIMER IC8
CHARGE START
RESTART SWITCH
Logic Vcc (14V)
POWER ON Q33,Q11
CHARGE BATT. SELECTION
CHARGE ON/OFF
CHARGE ORDER SET IC16A
BATT. SWITCH
BATT. REMOVAL TRIGGER
CHARGE CONTROL
CURRENT CONTROL IC20A
REF. VOL. IC19
-ΔV DETECTOR IC7A
PEAK HOLD
DETECTION INHIBIT
95MIN. TIMER IC6
-ΔV MISDETECTION PROTECTOR
CHARGE FLASHING PULSE GEN.
INDICATION CONTROL
CHARGE INDICATION
LIGHTING HOLD
START RESET IC10A

11. SCHEMATIC CIRCUIT DIAGRAM

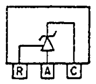

MODE SELECT SWITCH SW2 SDS-206N-3
CN2 (AD OUT)
To 3/3 To 2/3
T1 03220
L3 SBC6.6R6B662
L4 K12-8T12
D10 D15LA20
SW1 SE-W202A-30BB
L1 ELF10D431FN
L2 ELF10D431FN
D1 D3SB-60
TH1 NTH13D6ROLA
LED1 SLP18B-50 ALM INDI.
LED2 SLP18B-50 POWER INDI.
LED3 SLP18B-50 AD IND
LED0 SLP18B-50 FOR ADJUST
IC5A TC4011BP
IC5B TC4011BP
IC3A PC358
PC1 TLP521B
PC2 TLP541G
Q2 IRFPF50
OVER-CURRENT
OVER-VOLTAGE
OUTPUT VOLTAGE

NOTES: 1. F3-F5: THERMAL FUSES (102℃/2A)
2. 2SC3402, 2SA1348: TRANSISTOR WITH BUILT-IN RESISTOR

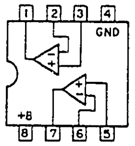

To 1/3
BATTERY BOX
CHARGE CURRENT
CHG OUT
BATT. DETECT SWITCH
To 3/3
To 3/3
To 3/3


To 2/3
To 2/3
To 1/3
To 2/3

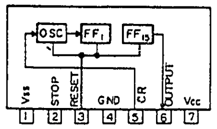
IC1, 2, 4, 19



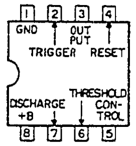
IC7, 3, 20, PC358


1 2 3 4
GND
+B
8 7 6 5

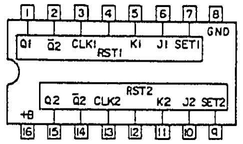
IC6


OSC
FF1
FF13
Vss
STOP
RESET
GND
CR
OUTPUT
Vcc
1 2 3 4 5 6 7

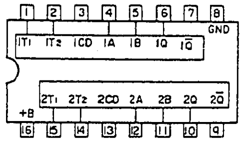
IC8


1 2 3 4
GND
OUT PUT
TRIGGER
RESET
THRESHOLD
DISCHARGE
+B
CON-TROL
8 7 6 5

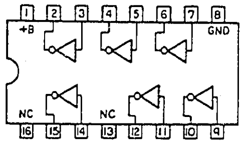
IC9, 17, 18

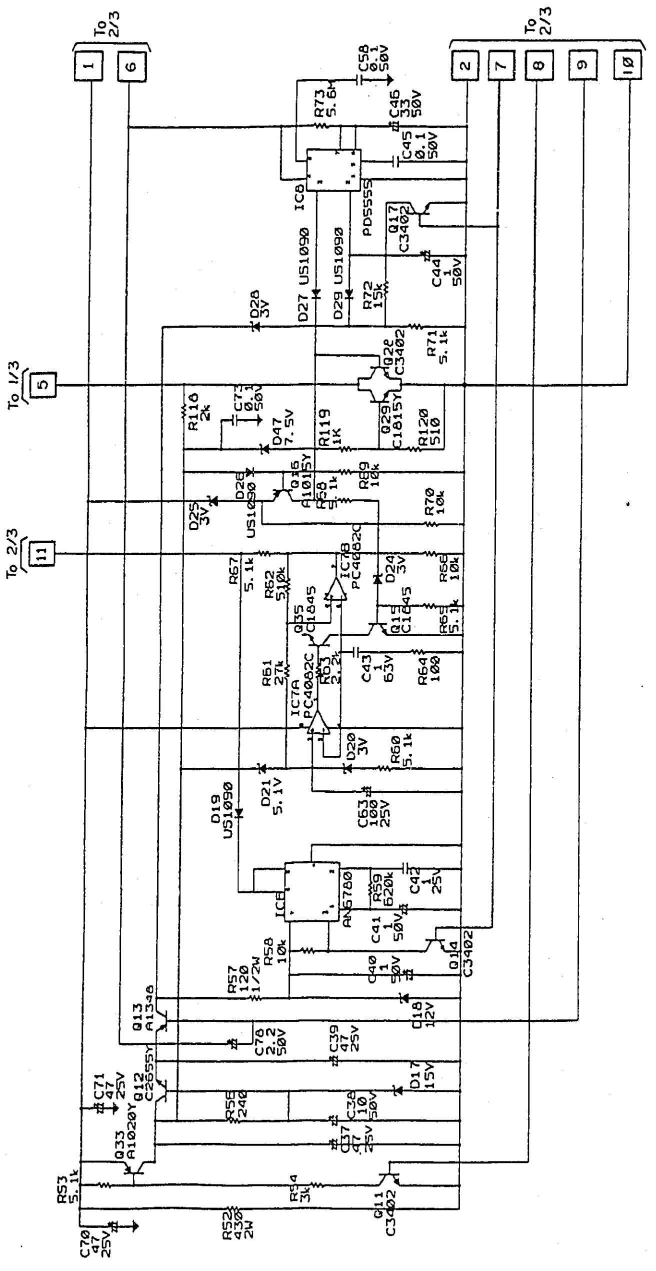

1 2 3 4 5 6 7 8
GND
Q1 Q̄2 CLK1 RST1 K1 J1 SET1
Q2 Q̄2 CLK2 RST2 K2 J2 SET2
+B
16 15 14 13 12 11 10 9

IC13

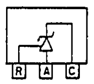

1 2 3 4 5 6 7 8
GND
1T1 1T2 1CD 1A 1B 1Q 1Q̄
2T1 2T2 2CD 2A 2B 2Q 2Q̄
+B
16 15 14 13 12 11 10 9

IC15

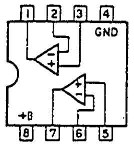

1 2 3 4 5 6 7 8
+B
GND
NC
NC
16 15 14 13 12 11 10 9


To 2/3
To 2/3
To 1/3
To 2/3
1
6
2
7
8
9
10
5
11
IC6
PD5555
IC8
AN6780
IC7A
IC7B
PC4082C
Q11
C3402
Q12
C2655Y
Q13
A1348
Q14
C3402
Q15
C1845
Q16
A1015Y
Q17
C3402
Q29
C1815Y
Q32
C3402
Q33
A1020Y
Q35
C1845
D17
15V
D18
12V
D19
US1090
D20
3V
D21
5.1V
D24
3V
D25
3V
D26
US1090
D27
US1090
D28
3V
D29
US1090
D47
7.5V
R52
430
2W
R53
5.1k
R54
3k
R56
240
R57
120
1/2W
R58
10k
R59
620k
R60
5.1k
R61
27k
R62
510k
R63
2.2k
R64
100
R65
5.1k
R66
10k
R67
5.1k
R68
5.1k
R69
10k
R70
10k
R71
5.1k
R72
15k
R73
5.6k
R110
2k
R119
1K
R120
510
C70
47
25V
C71
47
25V
C37
47
25V
C38
10
50V
C39
47
25V
C40
1
50V
C41
1
50V
C42
1
25V
C43
1
63V
C44
1
50V
C45
0.1
50V
C46
33
50V
C58
0.1
50V
C63
100
25V
C73
0.1
50V
C78
2.2
50V

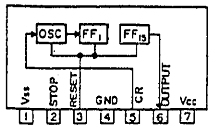
IC1, 2, 4, 19



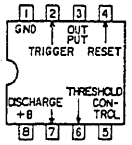
IC7, 3, 20, PC358


1
2
3
4
GND
+B
8
7
6
5

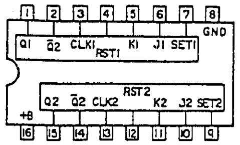
IC6


OSC
FF1
FF15
Vss
STOP
RESET
GND
CR
OUTPUT
Vcc
1
2
3
4
5
6
7

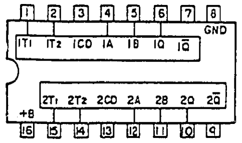
IC8


1
2
3
4
GND
TRIGGER
OUT PUT
RESET
DISCHARGE
+B
THRESHOLD
CON-TROL
8
7
6
5

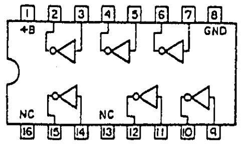
IC9, 17, 18


1
2
3
4
5
6
7
8
GND
Q1
Q2
CLK1
RST1
K1
J1
SET1
Q2
Q2
CLK2
RST2
K2
J2
SET2
+B
16
15
14
13
12
11
10
9

IC13


1
2
3
4
5
6
7
8
GND
1T1
1T2
1CD
1A
1B
1Q
1Q
2T1
2T2
2CD
2A
2B
2Q
2Q
+B
16
15
14
13
12
11
10
9

IC15


1
2
3
4
5
6
7
8
+B
GND
NC
NC
16
15
14
13
12
11
10
9

REPLACEMENT PARTS LIST

DELETED PARTS LIST

SYMBOL-NO	P-NO	DESCRIPTION
		CAPACITOR
C2271	0201001	CERAMIC CHIP 22PF+-5% 50V
		RESISTOR
RT 001	5040047	TRIMMER 10KOHM(VRT)
		SEMI-CONDUCTOR
D 204	5328951	DIODE DAN202K
D 412	5328951	DIODE DAN202K
Q 001	5326811	TRANSISTOR 2SB1001(VRC)
Q 002	5326101	TRANSISTOR FMW1 (VRC)
Q 123	5328971	TRANSISTOR 2SC2412KBRST
Q 625	5327073	TRANSISTOR DTC144ES
		MISCELLANEOUS
TH2206		THERMISTOR

ADDED PARTS LIST

SYMBOL-NO	P-NO	DESCRIPTION
		CAPACITORS
C2128	0206509	ELECTROLYTIC 10UF 16V
C2400	0201024	CERAMIC CHIP 27PF+-5% 50V
C2544	0201033	CERAMIC CHIP 150PF+-5% 50V
		RESISTOR
R2128	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
		SEMI-CONDUCTOR
D 609	5328951	DIODE DAN202K

CHANGED PARTS LIST

SYMBOL-NO	P-NO	DESCRIPTION
		CAPACITORS
C 477	0206513	ELECTROLYTIC 22UF 16V
C 478	0206513	ELECTROLYTIC 22UF 16V
C2415	0201029	CERAMIC CHIP 68PF+-5% 50V
		RESISTORS
R 409L	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R 409R	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R 415L	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R 415R	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R 417L	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R 417R	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R 429L	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R 429R	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R 441L	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R 441R	0103852	CHIP RESISTOR 5.6KOHM+-5% 0.1W
R 542	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 543	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 637	0103867	CHIP RESISTOR 100KOHM+-5% 0.1W
R 710	0103860	CHIP RESISTOR 27KOHM+-5% 0.1W
R 712	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R1677	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W(SERVO)
R1680D	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W(DMD)
R2001	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R2002	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R2139	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2143	01038	CHIP RESISTOR 2KOHM+-5% 0.1W
R2173	0103838	CHIP RESISTOR 390 OHM+-5% 0.1W
R2174	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R2179	0103832	CHIP RESISTOR 120OHM+-5% 0.1W
R2180	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R2181	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R2183	0103856	CHIP RESISTOR 12KOHM+-5% 0.1W
R2186	0103838	CHIP RESISTOR 390 OHM+-5% 0.1W
R2187	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R2229	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R2230	0103842	CHIP RESISTOR 820 OHM+-5% 0.1W
R2235	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R2237	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R2266	0103837	CHIP RESISTOR 330 OHM+-5% 0.1W
R2316	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R2407V	0103837	CHIP RESISTOR 330OHM+-5% 0.1W
R2591	0103834	CHIP RESISTOR 180OHM+-5% 0.1W
R2592	0103840	CHIP RESISTOR 560 OHM+-5% 0.1W
R2707	0103882	JAMPER CHIP
R2710	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
RT 402L	5040044	TRIMMER 1KOHM
RT 402R	5040044	TRIMMER 1KOHM
		COIL
L2229	5159251	CHOKE COIL 27UH+-10%
		MISCELLANEOUS
CP2209	5165082	FILTER

HITACHI

HITACHI SALES CORPORATION. TOKYO JAPAN
Head Office : THE HITACHI ATAGO BLDG. No. 15-12, 2-Chome
Nishi-Shinbashi Minato-Ku, Tokyo 105, Japan
Tel:03-3502-2111

AMERICA

HITACHI HOME ELECTRONICS (AMERICA), INC.

Headquarters, Western Regional Office
401 West Artesia Boulevard, Compton,
California 90220 U.S.A.
Tel:213-537-8383 Fax:213-631-4475

Eastern Regional Office

1290 Wall Street West, Lyndhurst, New
Jersey 07071 U.S.A.
Tel:201-935-8980 Fax:201-935-4869

Mid-Western Regional Office

1400 Morse Ave., Elk Grove Village, Illinois.
60007 U.S.A.
Tel:708-593-1550 Fax:708-593-2436

Southern Regional Office

510 Plaza Drive, College Park, Georgia
30349, U.S.A
Tel:404-763-0360 Fax:404-763-0416

HITACHI SALES CORPORATION OF HAWAII. INC.

3219 Koapaka Street, Honolulu, Hawaii,
96819 U.S.A.
Tel:808-836-3621 Fax:808-833-3449

HITACHI (HSC) CANADA INC.

Montreal Office & Manufacturing Division.
3300 Trans-Canada Highway, pointe Claire,
Quebec, H9R 1B1, Canada
Tel:514-697-9150 Fax:514-697-2209

HITACHI SALES CORPORATION DE PANAMA, S.A

Apartado postal 7657, Panama 5, Panama City,
Rep. of panama
Tel:63-65-00, 63-64-91 Fax:64-8827

HITACHI SALES CENTROAMERICANA, S.A.

Apartado Postal 10272-1000
San Rafael de Escazu, San Jose, Costa Rica
Tel:28-20-11 Fax:28-54-77

HITACHI SALES CORPORATION DE EL SALVADOR, S.A.

Apartado Postal N° 818 San Salvadore,
El Salvador 11a, Calle Oriente, N° 130
Tel:21-29-22, 22-60-14 Fax:22-8372

COMPANIA ELECTRONICA COLOMBIANA, S.A

Apatado Postal 14933
Calle 5a, N° 19-A-31, Bogota D.E.
Tel:47-91-16, 47-17-83 Fax:201-8710

MAYORCA – HITACHI, C.A.

Apartado Postal 61189 Caracas-Venczucla 3ra.
Transversal, entrc 1ra. Av. y Av.
Andros Bello Centro Comercial Cayorma.
Piso 3 Los Palos Grandes
Tel:284-90-67, 284-03-11 Fax:283-32-24

ELJURI HITACHI, S.A.

P.O. Box 738 Ave. Huayna Capac 8-57
Cucnca-Ecuador
Tel:831-188, 831-385 Fax:830-797

EUROPE

HITACHI SALES EUROPA GmbH

Rungedamm 2, 2050 Hamburg 80, Germany
Tel:040-734110 Fax:040-7340134

HITACHI SALES (U.K.) Ltd.

Hitachi House, Station Road, Hayes,
Middlesex UB3 4DR, England
Tel:081-848-8787 Fax:081-561-4565

HITACHI FRANCE (RADIO-T.V. ELECTRO-MENAGER) S.A.

95-101 Rue Charles-Michels,
93200 Saint-Denis, France
Tel:1-48-21-6015 Fax:1-42-43-6697

HITACHI SALES SCANDINAVIA AB

Domnarvsgatan 29 Lunda, Box 62,
S-163 91 Spanga, Sweden
Tel:08-7955600 Fax:08-7616250

HITACHI SALES NORWAY A/S

Postboks 68, Bruket 31, N-1620
Gressvik, Norge
Tel:09-328255 Fax:09-329340

SUOMEN HITACHI OY

Takojankatu 5, SF-15800 Lahti 80, Finland
Tel:918-527800 Fax:918-515273

HITACHI SALES A/S

Kuldyssen 13, DK-2630, Taastrup, Denmark
Tel:42-999200 Fax:42-999392

HITACHI SALES A.G.

Bahnhofstrasse, 19, 5600 Lenzburg,
Switzerland
Tel:064-50 22 11 Fax:064-51 60 56

HITACHI SALES WARENHANDELS GmbH

Kreuzgasse 27, A 1180 Wien, Austria
Tel:0222-421678, 0222-421679
Fax:0222-4393675

HITACHI SALES ITALIANA, S.p.A.

Via Ludovico di Breme 9, 20156 Milano, Italy
Tel:02-30231 Fax:2-33400021

HITACHI SALES BELGIUM S.A./ N.V.

Chaussee de Namur 56, B – 1400 Nivelles,
Belgium
Tel:067-21-71-81, 067-21-79-81
Fax:67-21-8078

HITACHI SALES IBERICA, S.A.

Gran Via Carlos Tercero. 101, 1-1,
Barcelona-08028 Spain
Tel:3-330-8652 Fax:3-339-7839

HITACHI SALES (HELLAS) S.A.

91 Falirou Street 11741 Athens, Greece
Tel:9229300 Fax:1-9235566

HITACHI SALES NETHERLAND B.V.

Industrieweg 17-19, 3762 EG Soest,
Postbus 465, 3760 AL Soest, Holland
Tel:02155-16544 Fax:02155-17324

ASIA, AFRICA, OCEANIA

HITACHI SALES (MALAYSIA) SDN. BHD.

Wisma Hitachi, No.2, Loronge 13/6A, 46200
Petaling Jaya, Selangor, Malaysia
Tel:03-7573455 Fax:03-7556090

HITACHI (SINGAPORE) PTE. LTD.

PSA Warehousing Services Alexandra Distripark
Block 1, # 01-03, Pasir Panjang Road
Singapore 0511
Tel:2787177 Fax:2734450

HITACHI SALES (THAILAND) LTD.

2240-46, New Petchburi Road, Bankapi,
Hueykuang Bangkok, Thailand
Tel:2-314-2741 Fax:2-319-2460

HITACHI ELECTRIC SERVICE CO., (HONG KONG) LTD.

3rd Floor Leun Tai Industrial Bldg., 72-76
Kwai Cheong Road Kwai Chung N.T.,
Hong Kong
Tel:420-4101, 424-0126 Fax:480-4493

Hitachi Sales Corporation of Taiwan

Room A, 11F1. No.180, Sec. 4 Chung Hsiao
E. Road, Taipei Taiwan, R. O. C.
Tel:02-721-6686 Fax:02-752-3211

HITACHI PRODUCTIONS MAROC ELECTRONIQUES DOMESTIQUES S.A

Rue du Havre, Casablanca, Morocco
Tel:212-2-30-73-68, 212-2-30-73-57
Fax:212-2-31-67-42

VL-S100(U)
VL-AC10(U)
VL-EC10(U)/EC20(U)

TK No.3447E TOKAI

Copyright © Hitachi, Ltd. 1991. All rights reserved.

Printed in Japan (I)